News of the Industry Begins Page 350

FEB 29 1928

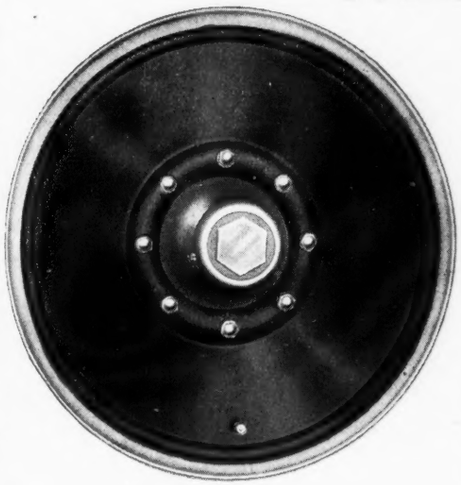
AUTOMOTIVE INDUSTRIES

Volume 58
Number 8

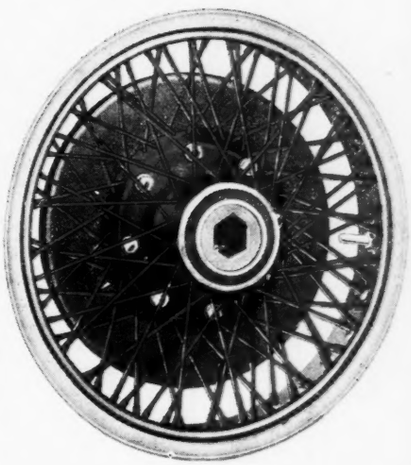
PUBLISHED WEEKLY AT CHESTNUT AND 56TH STREETS
PHILADELPHIA, FEBRUARY 25, 1928

35c a copy
$3.00 a year

Motor Wheel



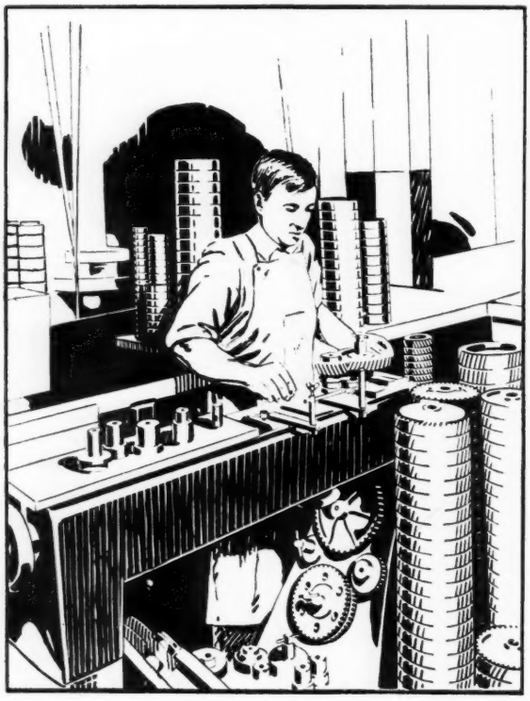
WITHOUT causing the dealer or the factory any worry, the prospect who wants what he wants can have wood, wire, or steel wheels on cars equipped by Motor Wheel. The perfected demountable wood wheel which makes this possible may be the favorable turning point in relatively few car sales. But its development by Motor Wheel typifies the kind of service and ability which is always working for the manufacturer who uses any Motor Wheel Products—standard wood wheels—Disteel wheels—Tuarc wheels—or the interchangeable line of wood, steel and wire.



MOTOR WHEEL CORPORATION
LANSING, MICHIGAN

Wood · Steel · Wire

Entered as second-class matter Oct. 1, 1925, at the post office at Philadelphia, Pa., under the Act of March 3, 1879



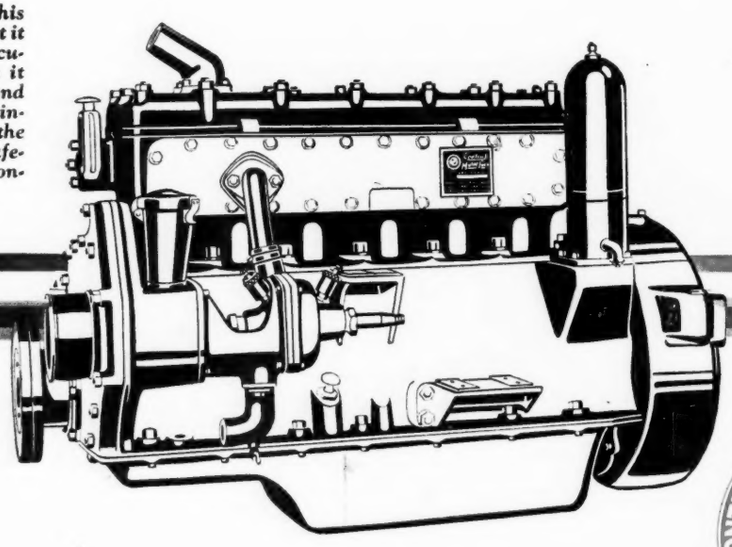
Unequalled Facilities

Continental, throughout its entire history of twenty-seven years has realized the tremendous part facilities mean to a business and a product. Today, two huge plants covering seventy-five acres, represent the successful efforts of this organization in developing and utilizing fine manufacturing facilities for the production of gasoline motors.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, Mich., U. S. A.
Factories: Detroit and Muskegon
The Largest Exclusive Motor Manufacturer in the World

Perfected over the years, this machine is so delicate that it magnifies the least inaccuracy or imperfection so it readily can be observed and measured. Such scientific instruments are typical of the fine equipment which safeguards the quality of Continental Motors.



CONTINENTAL MOTORS ★ Powerful as Fire ★ Nation ★ AMERICA'S STANDARD

Continental Motors

AUTOMOTIVE INDUSTRIES
VOLUME 58 *Philadelphia, Saturday, February 25, 1928* NUMBER 8

Wholesalers Unite *for* Closer *Business Problem* Study

Convinced after conference in Washington that their fortunes depend on adapting themselves to new conditions rather than in appealing to manufacturers for assistance.

By John C. Gourlie

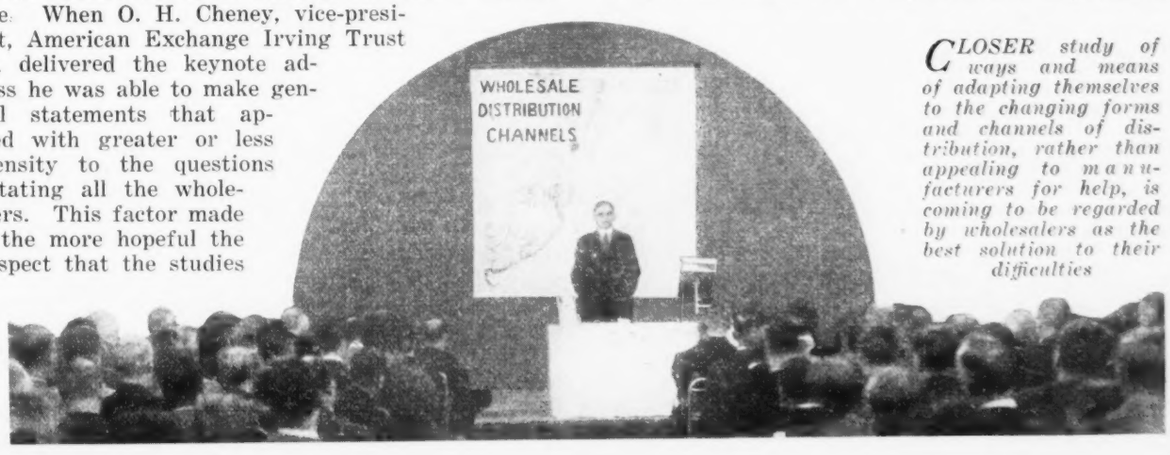
WHOLESALERS generally are becoming convinced that the solution to their difficulties lies in closer study of ways and means of adapting themselves to the new conditions of wholesaling and the changing forms and channels of distribution, rather than in appealing to manufacturers for help in the way of longer discounts and other devices more or less precluded by the intensity of present-day competition.

This is the outstanding conclusion to be drawn from the discussions, committee reports and resolutions of the National Wholesale Conference held last week in Washington by the domestic distribution department of the United States Chamber of Commerce. The statement applies as well to all of the 36 trades represented at the conference—the first of its kind ever held—as to the automotive group, which had some conspicuous contributions to make to the gathering.

It was, indeed, highly interesting to note the similarity of the distribution problems presented by the various industries whose wholesalers were in attendance. When O. H. Cheney, vice-president, American Exchange Irving Trust Co., delivered the keynote address he was able to make general statements that applied with greater or less intensity to the questions agitating all the wholesalers. This factor made all the more hopeful the prospect that the studies of the markets, functions and practices of wholesaling which are to be made by committees of the conference under the domestic distribution department and to be presented later, will be of real benefit to each trade.

On the whole, the sentiment of the conference was cheerful and imbued with the conviction that the wholesaler is an indispensable element of distribution and destined to prosper so long as he keeps in step with the progress of trade and industry. As was to be expected, those in attendance were in the main the most successful types of wholesaler, but while they felt that their own prosperity was not in question, they evidently believed that a wider knowledge of the best business practices was greatly needed if the reflections cast upon wholesaling by the public and to some extent by manufacturers and bankers were to be overcome.

Although, as already noted, there was little disposition to appeal to manufacturers for help, occasional criticisms were directed at manufacturers and a number of plans for improvement of wholesaling were considered which are of paramount importance to



CLOSER study of ways and means of adapting themselves to the changing forms and channels of distribution, rather than appealing to manufacturers for help, is coming to be regarded by wholesalers as the best solution to their difficulties

manufacturers in practically all lines of business.

Group buying, for instance. A growing practice in the automotive trade, this apparently has spread much further in other lines. In groceries both retailers and wholesalers have pooled buying in the effort to meet chain store competition and a group of 17 department stores with a sales volume of nearly $400,000,000 yearly has similarly combined for purchases. A. Lincoln Filene urged the wholesalers to form buying groups.

Sentiment at the conference was apparently much in favor of cooperative buying, and this is one of the subjects to be given further study. The long-range consequences of the rise of group buying are something to which manufacturers might well give serious thought. In the automotive field it has been conceded that sales to the trade have been in the main more profitable than sales to other manufacturers. But if group buying greatly reduces the number of individual buyers, will the advantages hitherto found in selling to the trade still be available?

Opportunities Limited

Of course the manufacturer generally is seeking wider distribution through whatever sources are available, a point well recognized at the conference as an outgrowth of the new competition; but in the automotive industry this has not gone so far as in others, nor do the same opportunities appear to exist. A few products will find their way to the public through wholesalers and chain stores in non-automotive fields, but not the great majority, according to present indications. This primarily strengthens the position of the wholesaler in the automotive trade.

The need for mutual understanding on the part of manufacturers and wholesalers was stressed, and led to recommendations that manufacturers become members of trade associations with wholesalers. Harry G. Moock, managing director, Greater Market Development, pointed out that this was already the case with the Automotive Equipment Association and he was able to show that many of the studies and much of the educational work proposed at the conference was being done in automotive wholesaling. F. B. Caswell, Champion Spark Plug Co., introduced Mr. Moock.

Another movement of considerable importance to manufacturers concerns the elimination of unprofitable items by wholesalers. This was favored by the conference, and was proposed for further investigation. The question of how far a wholesaler can go in such eliminations in view of the necessity for rendering a complete service to retailers was raised by Percy Stern, Interstate Electric Co., anA.E.A. member.

Although items eliminated by one wholesaler tend to be taken up by another, perhaps better fitted to handle the line, a manufacturer may find that a trend of this sort is seriously hampering the distribution of his product. The answer in such cases would seem to lie in the examination of the causes for the eliminations with a view to making the line more attractive to wholesalers.

Criticism on Two Points

Only two points of specific criticisms of manufacturers were given any prominence in the discussions. One concerned missionary salesmen, a speaker declaring that such salesmen were economically unjustifiable and raised the cost of distribution. Others, however, apparently did not consider missionaries objectionable and there was no test of the preponderance of opinion on this point.

The other objection was to the failure of manufacturers to feel the need for absorbing the cost of certain services introduced of recent years by wholesalers in various lines—such as free trucking of groceries to distant points by wholesale houses. But, as evidencing the new spirit of the leading wholesalers, it seemed to be felt by many that the wholesalers themselves were at fault in allowing the stress of competition to lead them into expenses that they never should have assumed.

Again and again the wholesalers were urged to stand upon their rights in the realization that they had an economic function to perform and therefore deserved to make profits. But there was no lack of appreciation of the fact that many wholesalers are in danger of losing their economic justification through failure to adapt themselves to new conditions. Mr. Cheney at one point spoke of the manufacturer's position, saying:

"The manufacturer, in most cases, thinks that the wholesaler is not giving him service—that he is not stocking and pushing his particular lines—and he has had to send around specialty salesmen and missionary salesmen to make sure that his goods are getting the sales effort they so obviously deserve. The manufacturer feels that the wholesaler is buying from hand to mouth and thus dislocating his production schedule. The manufacturer feels that the wholesaler is just waiting for the chance—if he has not already taken it—to push his own private brand into the market which the manufacturer built up by expensive advertising. And there are enough other charges to take up the next session of Congress."

The Wholesaler's Position

Mr. Cheney went on to say that certain wholesale functions are inescapable, but that this did not mean that the wholesaler as such had any reason for existence—it was merely a question of who could perform the functions most economically. So long as the wholesaler could continue to do this he would remain in business and prosper. He continued:

"A wholesaler finds that some of his retailer customers are beginning to buy direct from the manufacturers; or one finds that the chain store is invading his territory and cutting the volume which the independents buy from him; or one finds some of his retailers organizing a buying group—the wholesaler who finds himself with these problems sees these problems only. He does not see that he is caught in a great and intricate process of continual change which is affecting all economic relationship.

"He feels, somehow, that his rights are being violated—he feels that the functions of distribution are charted on a blueprint and nobody has a right to do business except according to the blueprint. What the wholesaler—and the manufacturer and the retailer, too—must see is that business is not really a machine but a living thing—with all the inexplicable and unpredictable behavior of living things. It grows and charges constantly, sometimes slowly, sometimes quickly. In changing it keeps some of the old even when it is useless and takes on something new even when it is not proved useful."

But Mr. Cheny pointed out that even if some of the new forms of distribution had taken business away from wholesalers unable to understand or to cope with

(Continued on page 344)

Who Will Make Money in 1928?

THIS very pertinent question is asked because we hear a lot of talk about there being plenty of business for all this year, but with sales at prices that curtail profits.

Can it be that manufacturers and dealers are deliberately starting 1928 with the determination to have a large gross but a small net?

This would scarcely seem to be a general policy of progressive, logical and experienced business men; so the question arises as to whether the large-volume-and-small-profit idea is a belief or a fear.

Why should manufacturers and merchants adopt the business policy of having a large volume in 1928 out of the profits of 1927? Would it not be better to have large profits in 1928 even though volume were less than in 1927?

The laws of industry are like other laws—they follow the line of least resistance and just so long as sellers teach buyers that price is superior to quality it will become necessary for business men to sacrifice ideals and profits for volume.

Competition may either be a friendly bacteria or a parasite, for competition (like many other words) is a descriptive term with two meanings. It can either be strife for the same object, or it can be a deliberately-planned, cut-throat proposition for the purpose of destruction.

Anyone who believes in America and the men who made it politically and commercially cannot conceive that the mental attitude of our leaders should so change as to make destruction the main object of competition in 1928; hence why not have the courage to sell on a quality basis and not sacrifice all profits for volume?

Now is the time for every manufacturer and merchant in the country to realize that he cannot wait for the other man to set him an example, but he must, in common with others, set competitors an example.

There will be plenty of business for all this year, so why not adopt the slogan: "Profits as well as volume"?

C. A. MUSSELMAN
President, Chilton Class Journal Co.

Automotive Industries
February 18, 1928

PERSONAL touch with the detailed activities of every phase of the operation of his companies is the most prominent characteristic that stands out as a result of any attempt to analyze the things which have made possible the successful achievements of Auburn's president

E. L. CORD, "All-Round"

At 33 He Ranks as One of the Most Successful and Unique Organizers in the Industry

By Norman G. Shidle

NEW YORK Show week. The Auburn exhibit at the Commodore Hotel. A prosperous-looking gentleman just passing middle age has ordered a new "115" sedan. He hadn't come in to buy. The car has been sold to him.

Turning to leave the exhibit, he is impelled to say a few words of praise to the keen, alert and conspicuously well-informed salesman who got his name on the dotted line. "Young man," he says with just a barely perceptible note of condescension in his tone, "young man, you have tied up with a good company. Auburn puts out a fine automobile and if you keep plugging you should make good progress with the organization."

A sweeping gesture of the hand, a slight bow and he is gone.

And a moment later E. L. Cord, president of the Auburn Automobile Co. and one of the outstanding executive successes of recent years in the automotive industry, is chuckling over the incident and probably is feeling justly proud of the fact that he still can gain unbiased praise as a salesman of the product which he is building.

Personal touch with the detailed activities of every phase of the operation of his companies, illustrated by the incident above, is the most prominent characteristic that stands out as a result of any attempt to analyze clearly the things which have made possible the successful achievements of Auburn's president. Mr. Cord has the distinction, held by few chief executives in any industry, of knowing the technique and fundamentals of every phase of his business so well as to be able to operate in any department with the skill and ease of an expert.

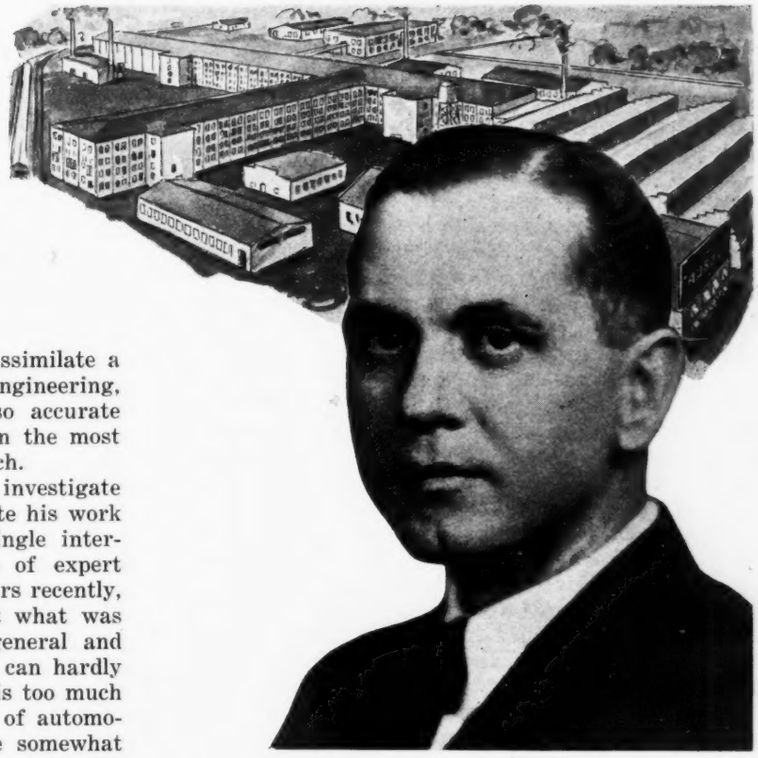
Speed of the Boss is Speed of the Gang

"The speed of the boss is the speed of the gang," someone has said and the progress made by Auburn in recent years is an outstanding example of the truth of that statement. "What are Cord's recreations?" we inquired of an Auburn distributor who has been a personal friend and associate of his for many years. "How does he spend his spare time? What is his hobby?"

"Work," came the reply quickly and unhesitatingly. "Cord works harder and longer hours than any man in the whole organization—and he gets a great kick out of it."

After several hours informal conversation with the Auburn head, moreover, it isn't at all difficult to accept this estimate of him. Although he got his real start in the automobile business as a salesman, E. L. Cord probably never was a typical salesman in any sense of the word. Had he been, he never would have had

Auburn's Executive



A more conventional portrait of Mr. Cord. He explains Auburn's phenomenal growth during the past several years as being due to "just refraining from making the mistakes which other small companies have made in the past"

time in the 33 years that he has lived to assimilate a knowledge of every phase of automotive engineering, production, financing and merchandising so accurate and so detailed as to make him at home in the most technical discussion of experts in any branch.

For a single man to interview Mr. Cord, investigate his achievements and try properly to evaluate his work is an unusually difficult task, since the single interviewer can't have an equally wide range of expert knowledge. Over a period of some three hours recently, we talked informally with Mr. Cord about what was going on in the automobile business in general and about his own activities in particular. We can hardly say we interviewed him, because Mr. Cord is too much bound up in the practical, concrete realities of automotive problems to lend himself much to the somewhat abstract superficialities which tend to permeate the average "interview." During the time that we talked with him, however, we heard him discuss casually and unaffectedly almost every type of automotive problem with equal familiarity and with that lack of ostentatiousness in every case which so clearly bespeaks basic understanding of the subjects under discussion. He moves from financial evaluation of automotive properties to technical details of how to solve steering problems, arising from application of front wheel drives to stock cars, with almost startling ease.

Has Made Them Take Notice

Much has been heard of Mr. Cord in the automotive industry in recent years. His development of the Auburn Automobile Co. from a relatively obscure position to one of marked prominence, of course, first gained him the limelight. Then more recently his purchase of the Duesenberg organization and of several parts companies has made people sit up and begin to wonder just where this vigorous young executive is planning to go. Rumors of further purchases by him from time to time have tended to heighten the general interest of the industry in his plans and activities. A few cautious spirits have even wondered if he might not be trying to move too fast.

There is little likelihood of this latter situation developing. Nobody could talk with E. L. Cord for any length of time and come away with the slightest fear that his ambition might run away with his judgment. There appears to be in him none of that urge for power, that tremendous drive for dominance which has wrecked the growing careers of many able men in the past.

E. L. Cord quite obviously is very much bound up in the doing of a good job; the working out and solving of practical problems; the building of progress step by step on solid foundations. There is nothing in his whole approach to his work that gives the remotest suggestion of any illusions of grandeur. He very definitely impresses one as a keen, straight-thinking, analytical, vigorous young executive who gets a real joy out of hard work, but who is unusually well endowed with those human qualities which go to make a true leader rather than a mere ruler. He is the type of man we would expect to echo the statement made the other day by Ray A. Graham when Mr. Graham was greeted by tumultuous applause as he rose to speak at a dealer meeting. "Thank you," Mr. Graham said, "I appreciate the welcome, but applause has always meant just one thing to me and that is 'Young man, you've got a good job—see that you don't lose it."

With a thoroughly sound approach to his problems, however, there is no doubt that Mr. Cord sees ahead the possibilities for further consolidation and expansion of his properties. Basic in all of his plans, of course, is the Auburn Automobile Co. which he has brought from a sale of about 2500 cars in 1914 to a sale of something over 15,000 cars in 1927. The financial progress of the company under Mr. Cord's regime has been even more impressive, the company having shown a deficit of $69,830 in 1924 as against a profit of $943,262 in 1926 and a profit well in excess of $1,000,000 in 1927. Last year, Mr. Cord says, there was never a day when the Auburn Automobile Co. did not have $3,000,000 cash on hand.

Believes in Playing Safe

This record indicates clearly Mr. Cord's general ideas of operation. His past work shows a belief in finding ways and means to operate at a profit those properties already in hand before going out to acquire new investments to worry about. He is a strong believer in the idea that any automotive product, whether it be a complete car or a part, can be sold at a fair profit so long as the product itself is built to a high standard, the

service of the product is sound and consistent and the sales effort put behind it is forceful and intelligent.

This idea is emphasized by the policies he is adopting in connection with his more recently acquired parts companies. Speaking of his aims for the Lycoming Manufacturing Co., which he acquired Sept. 6, 1927, for example, Mr. Cord said:

"I have no intention of getting into the kind of price competition that some parts makers have let themselves in for. There is nothing to be gained by parts makers striving so hard for business that they sell at a price which yields no profit. Down at Lycoming we are going to continue to build the best engines we know how to build. We are going to sell those engines at a price which will yield a fair profit; a profit which will enable us to keep up the quality and service behind the product. Whatever business cannot be obtained on that basis, I'm afraid we will have to lose. But I am confident that our operations can be conducted successfully on that basis. This is indicated by the fact that Lycoming has just completed the most successful year in its history as regards both profits and production and that it has on its books a volume of orders that make even greater success in 1928 practically certain.

This same approach to all problems of building an enterprise is embodied in Mr. Cord's reply to our inquiry "How did you make Auburn successful?"

"Just by refraining from making the mistakes which other small companies had made in the past. Name the small company which has not been successful and I believe I can tell you pretty exactly why they have failed to make good. There wasn't any attempt to apply a success formula to Auburn; we just went ahead carefully and avoided making mistakes.

"The trouble with the automobile industry sometimes," Mr. Cord went on, "is that it tends to get into ruts. Old heads of companies have had to be changed from time to time because they just couldn't see the absolute necessity of trying new methods and new ways of meeting the new conditions of operation in the automobile business. The methods of 10 years ago won't do the job today. We've got to keep out of ruts; our minds must remain flexible and honestly open to the possibilities of trying out new things."

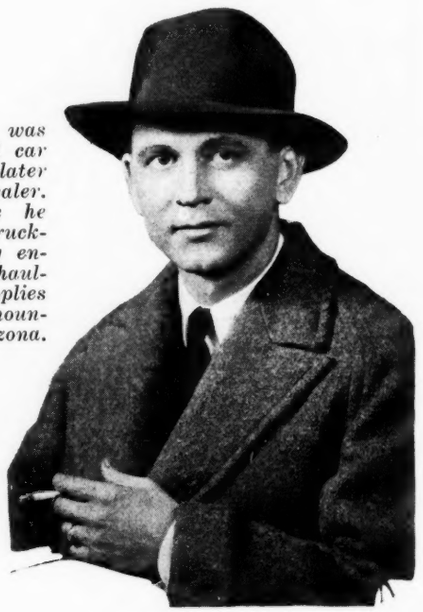
New Line of Duesenbergs

Mr. Cord's plans for Duesenberg, Inc., which he also acquired last September, are fairly well known in general. He has in process of completion a new line of Duesenberg cars in which he hopes to incorporate all that is finest in motor car design, price to be a minor consideration in laying out the job. No definite date has been set for the final announcement of the new Duesenberg car, but Mr. Cord stated informally the belief that they will not be ready much before June of 1928.

Mr. Cord is making good use of the facilities of the Limousine Body Co., another acquisition of September, 1927.

It is worth special note that, despite his interest in and attention to financial and sales matters, Mr. Cord sees fundamental engineering and technical progress as the keystone on which will rest the future progress of his companies. He is interested, not only in putting into his present product all of the technical advances that can be properly engineered into them, but also in experimentation with quite novel and radical departures from conventional practice with the thought that very marked departure from present design standards may be a part of future automotive progress.

"Auburn is not yet generally thought of as an organization which devotes a large amount of time and money to engineering development," Mr. Cord remarked in the course of a conversation along engineering lines. "We've been so busy doing things with a relatively small force out at Auburn that we haven't had time to tell



Mr. Cord was once a used car dealer and later a new car dealer. For a time he operated a trucking company engaged in hauling mine supplies over the mountains of Arizona.

the world about our activities to the extent that some others have. As a matter of fact, we spent no less than $400,000 in engineering development work during 1927. And I plan to continue expenditures for this sort of development, because it is basic to the future success of any automobile company today.

"There has been plenty of comment about your expansion activities," we said to Mr. Cord, "but it would be interesting to know your opinion as to the future of the small passenger car company. Do you expect to get big—or do you see a future for the smaller company?"

"We hope to continue to expand and to grow larger," Mr. Cord replied, "but I see a very definite and excellent future for the smaller automobile company as well. There will always be a place for a certain number of smaller, soundly operated passenger car manufacturers. There is even the possibility that the number of smaller companies will multiply, perhaps marketing over a limited area and depending on local pride and local support for their success. Numerous truck companies have been put over on this basis and it may be an outside possibility in the passenger car field; I'm not sure. In any case there always are going to be some successful small passenger car producers."

While it was quite apparent from Mr. Cord's conversation that he has in mind certain very definite lines of expansion for his holdings, it was equally apparent that he intends to move only so fast as he feels he can go with a high degree of safety.

"A few years back," he said, "we had difficulty in getting enough money to do the things we needed to do. At present I am being offered capital to buy several properties which I cannot see my way clear to operate properly under present conditions. We aren't going to jeopardize any of our going companies or going lines by injection of radical ideas in design or by taking on greater loads than we can carry. Any pioneering we

may do—and we expect to do some—will be projected as a distinct operation which will not jeopardize any of our present activities in any way."

The detailed story of Mr. Cord's personal history is now perhaps too well known to bear repeating in all of its elements. He got into the automobile business "just like any other kid," as he puts it himself. He used to hang around automobile establishments; he liked to drive cars; he was interested in racing; he wanted to live with automobiles. As a result he got a job selling them out in Los Angeles. He was once a used car dealer and later a new car dealer. For a time he operated a trucking company engaged in hauling mine supplies over the mountains of Arizona.

Suffering business reverses, he arrived in Chicago in 1919 practically without resources. He began to sell cars for a Chicago distributor. John Quinlan was sales manager. When Mr. Quinlan took over distribution of Moon in the Chicago district, Mr. Cord went with him, beginning a business association which later grew into a partnership in the Quinlan Motors Co.

In 1920, Mr. Cord sold his interests in the Quinlan company and took over the wholesale distribution of Moon cars in Wisconsin. A year later he sold this business at a profit, bought back a one-fourth interest in the Quinlan Motors Co. and became its general manager. Under his management this company, from January, 1922, to June, 1922, sold 5000 cars at wholesale in the Chicago district.

In June, 1924, Mr. Cord again sold out his interest in the Quinlan company. Auburn was at that time in a bad sales slump with heavy inventories of obsolete materials on its hands. Negotiations with bankers behind the Auburn company resulted in Mr. Cord's going to Auburn as general manager. Shortly he was elected vice-president and at the beginning of 1926 became president of the organization.

Simplicity, directness, frankness, singleness of purpose—those qualities which have made automotive leaders and outstanding figures of such men as Charles W. Nash, Walter P. Chrysler, Alfred P. Sloan, Jr., and others—these are the qualities which seem most characteristic of this youngest executive whose star has risen so high on the automotive horizon. On our way to talk with Mr. Cord, we remarked to a member of his organization that we were going to ask Mr. Cord what was responsible for Auburn's success. "That ought to be a very short interview," our companion remarked, "because the answer is brief; it's just 'E. L. Cord.'"

But despite the high esteem in which Mr. Cord is held by his own organization and the credit which they all seem to give him as the keystone of their achievement, he has not built a one-man organization. He delegates authority just as any other successful executive.

Perhaps no better summary of Mr. Cord's generally modest and matter-of-fact approach to his problems could be given than to quote his own estimate of his job. "My contribution," he says, "is purely conversational."

Barrel Gages Employed by Chrysler for Fitting Pistons

TO insure perfect balance and fit in piston and connecting rod assemblies, Chrysler Corp., at its Highland Park plant in Detroit, employs some very interesting methods.

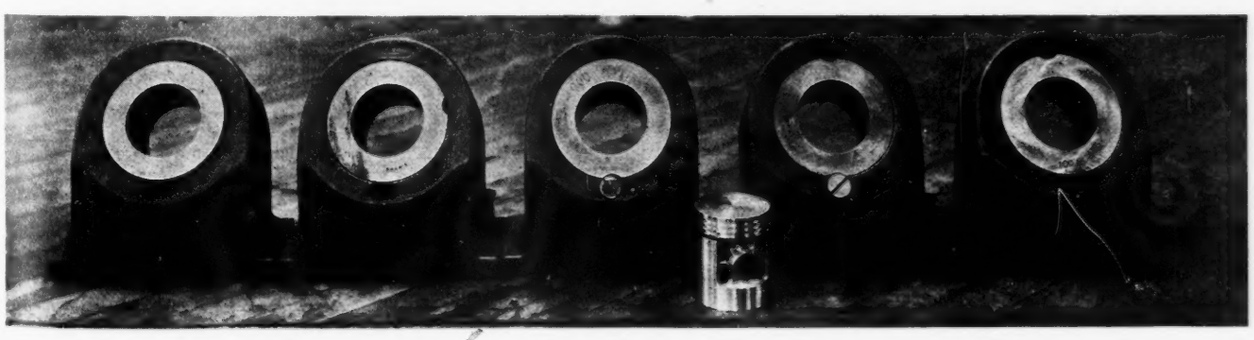
In order to get the proper fit between the pistons and the cylinder bore, with as little opportunity for the human equation to enter as a source of error as possible, barrel gages such as those illustrated in Fig. 1 are employed. These gages are hardened, ground and lapped and vary in inside diameter by 0.0005 in.

Pistons from the production line are very quickly and accurately classified according to sizes by testing them with these barrel gages. There are no dials to read, the inspector merely determining the smallest gage into which the piston will enter. The size so determined is stamped on the piston and then they are weighed and sorted into weight classes which vary by very small increments.

Cylinder bores are checked for size in the same fashion but by means of plug gages which vary in size by 0.0005 in., and the size of each bore is stamped on the block alongside. A ticket is made out at the same time which shows the motor number and the size of all the bores in the block. This ticket is forwarded through a pneumatic conveying system to the connecting rod and piston assembly bench.

Connecting rods are checked for total weight and for crank weights and are separated into balanced sets. Pistons are then assembled to matched sets of rods and the assembly again checked for total weight. The pistons selected for each set are not only within the same weight class but their size class corresponds to the bore sizes given on one of the tickets which has been received from the cylinder block line.

Thus, as each cylinder block moves past the piston-connecting rod assembly bench, there is waiting for it, and tagged with its number, a complete set of assembled pistons and rods which are the exact size required for that particular block and which are in proper balance relation with one another.



Barrel gages varying by 0.0005 in. inside diameter used by Chrysler for sizing pistons

Uniform Motor *Bus* Specification Code *is* Submitted

Indorsement of 18 national organizations sought and adoption by all States is ultimate aim. Expected to relieve manufacturers and operators of hardships.

By K. W. Stillman

A UNIFORM Motor Specification Code, fostered by the Society of Automotive Engineers, the Automobile Chamber of Commerce, the Motor Vehicle Conference Committee and other interested agencies, has been prepared and submitted to some 18 national organizations for indorsement.

This is a further step in a movement instituted about two years ago as an attempt to relieve bus manufacturers and owners of the difficulties forced upon them by the many conflicting regulations and restrictions governing the design and operation of buses in the several states. It is hoped that eventually the code will be adopted without substantial change by all states so that complete uniformity will be obtained in regulatory requirements affecting bus specifications.

As has been pointed out in these columns several times in the past, the present condition of regulatory restrictions works a severe hardship upon bus owners and manufacturers. Not only are there many restrictions or requirements which appear to be quite unnecessary to the prime purpose of safeguarding the public, but which necessarily add to the cost of bus design or operation, while of still more baneful influence are conflicting restrictions imposed by neighboring states which prevent a bus, legally operated in one state, being operated legally in the other.

In the covering letter which accompanies the proposed code many of these burdening restrictions are outlined in order to emphasize the need for a uniform system of regulation. Enough of these have been presented in previous articles appearing in *Automotive Industries* so that they need not be reviewed now.

In formulating the code, the committee, under the chairmanship of George H. Scragg, has followed the basic dictum that, wherever possible, regulation should specify the result desired rather than the method by which it is to be accomplished, thus not placing any hindrance in the way of further engineering developments and permitting each manufacturer to use his best judgment as to actual means employed to comply with the regulations.

While not included in the code proper, the detailed discussion of the code contains a number of negative recommendations in which it is advised that no regulations be imposed regarding certain features, all of which have been made the subject of regu-

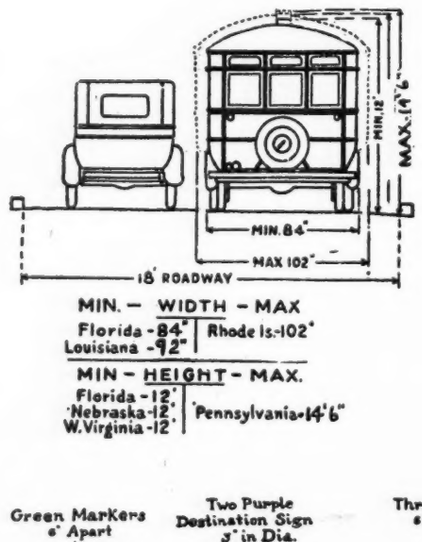
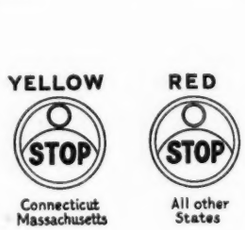
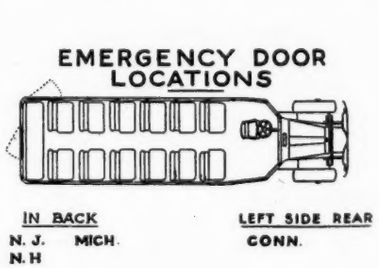
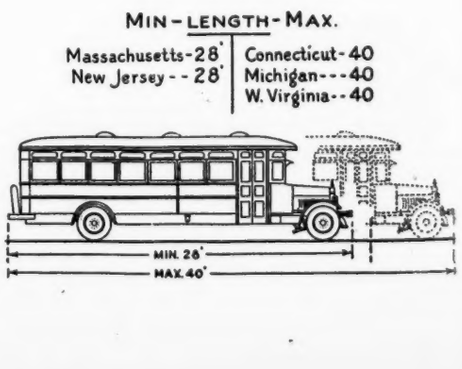


Chart showing conflictions in restrictions on bus design and operation imposed by present laws



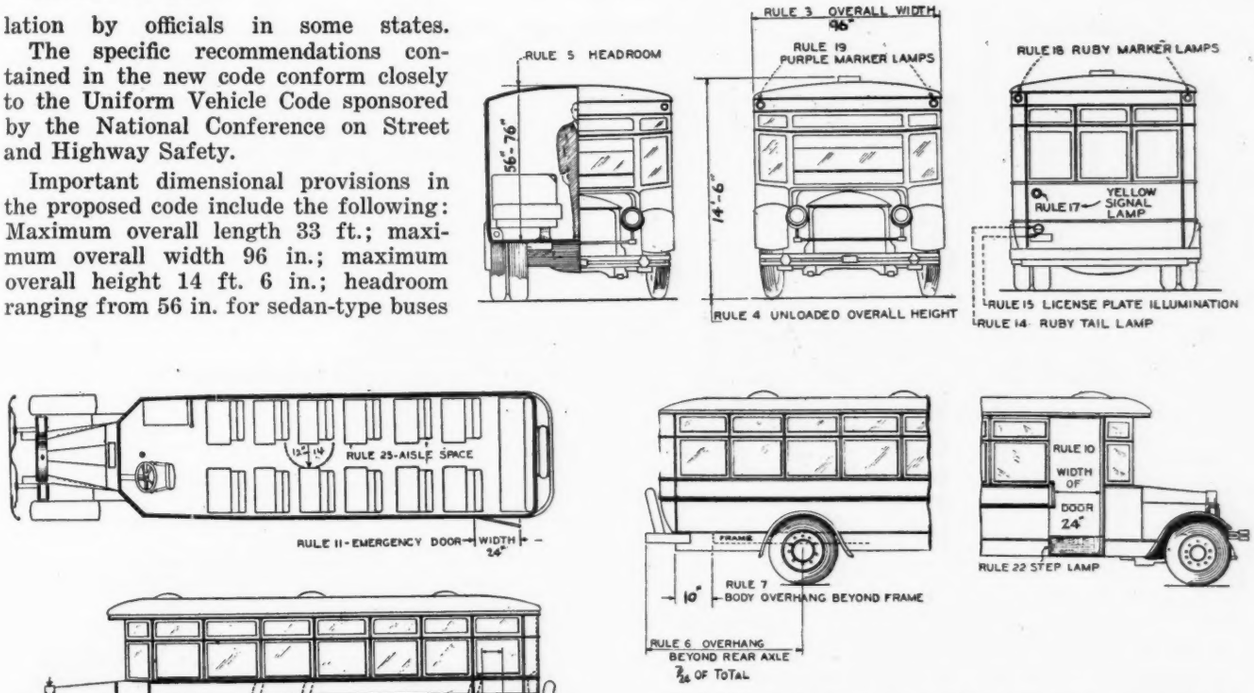




lation by officials in some states.

The specific recommendations contained in the new code conform closely to the Uniform Vehicle Code sponsored by the National Conference on Street and Highway Safety.

Important dimensional provisions in the proposed code include the following: Maximum overall length 33 ft.; maximum overall width 96 in.; maximum overall height 14 ft. 6 in.; headroom ranging from 56 in. for sedan-type buses


RULE 5 HEADROOM
56"-76"
RULE 3 OVERALL WIDTH 96"
RULE 19 PURPLE MARKER LAMPS
14'-6"
RULE 4 UNLOADED OVERALL HEIGHT
RULE 18 RUBY MARKER LAMPS
RULE 17 YELLOW SIGNAL LAMP
RULE 15 LICENSE PLATE ILLUMINATION
RULE 14 RUBY TAIL LAMP
RULE 25-AISLE SPACE
RULE 11-EMERGENCY DOOR-WIDTH 24"
RULE 26-24" KNEE ROOM
RULE 11-6" EMERGENCY AISLE
RULE 2-OVERALL LENGTH 33'
FRAME
10"
RULE 7 BODY OVERHANG BEYOND FRAME
RULE 6 OVERHANG BEYOND REAR AXLE 7/24 OF TOTAL
RULE 10 WIDTH OF DOOR 24"
RULE 22 STEP LAMP

Graphic picture of some of the major recommendations made in the proposed uniform bus specifications code

to 76 in. for city-type; maximum overhang of body beyond rear axle, 7/24ths of total vehicle length; maximum overhang of body beyond frame 10 in.; minimum aisle space 14 in. for city-type buses and 12 in. for parlor cars; minimum clearance between seats 24 in.; rear bumpers extending at least 4 in. beyond bus body at frame level; service doors with minimum width of 24 in.; emergency door at left side, rear, at least 24 in. wide and accessible by a clear aisle at least 8 in. wide.

Other recommendations made in the way of expressing the result to be obtained rather than the exact method of obtaining it include: Adequate ventilating system; suitable passenger stop signal; in city type buses, a guard rail to prevent standing passengers from obstructing the operator's view; brakes to conform with Uniform Vehicle Code; gasoline tanks to be installed, filled, drained and vented outside of the body; exhaust pipe to extend to rear of body, to point immediately in front of left rear wheel or to the roof; a muffler which will reasonably quiet the exhaust; door hinge and jam guards to prevent injury to passengers.

Lighting regulations recommended are patterned entirely upon the basis of getting results, no particular sizes of lamps or lenses being specified but the requirements consisting of legibility at certain specified distances. Tail-lamps are to be ruby and visible at 500 ft.; registration plate illumination should be white and make the license tag legible at 50 ft.; not to exceed two spot-lamps can be used under certain conditions; rear signal lamp, yellow, should be visible 500 ft. to the rear; marker or identification lamps should consist of two rear ruby lamps and two front purple lamps, all placed at upper corners of body and the former visible for 300 ft. and the latter 500 ft. Interior lighting should provide one rated candle power per square foot of floor area. A step lamp is necessary for all but sedan type buses.

Among the items which have been made the subject of regulation in some states but which the committee believes should not be so handled and makes definite recommendations to that effect are the following:

Length or width of the body as a unit separate from the chassis; grade of material used for wheel housings; materials used for footboards; window guards; special signaling window for the driver; dimensions or specifications of chassis frame.

The accompanying illustrations show the extent of the conflict which now prevails among the several states which have attempted to regulate buses, and the major dimensional and lighting recommendations made by the committee are also shown.

Danish Automobile Taxes

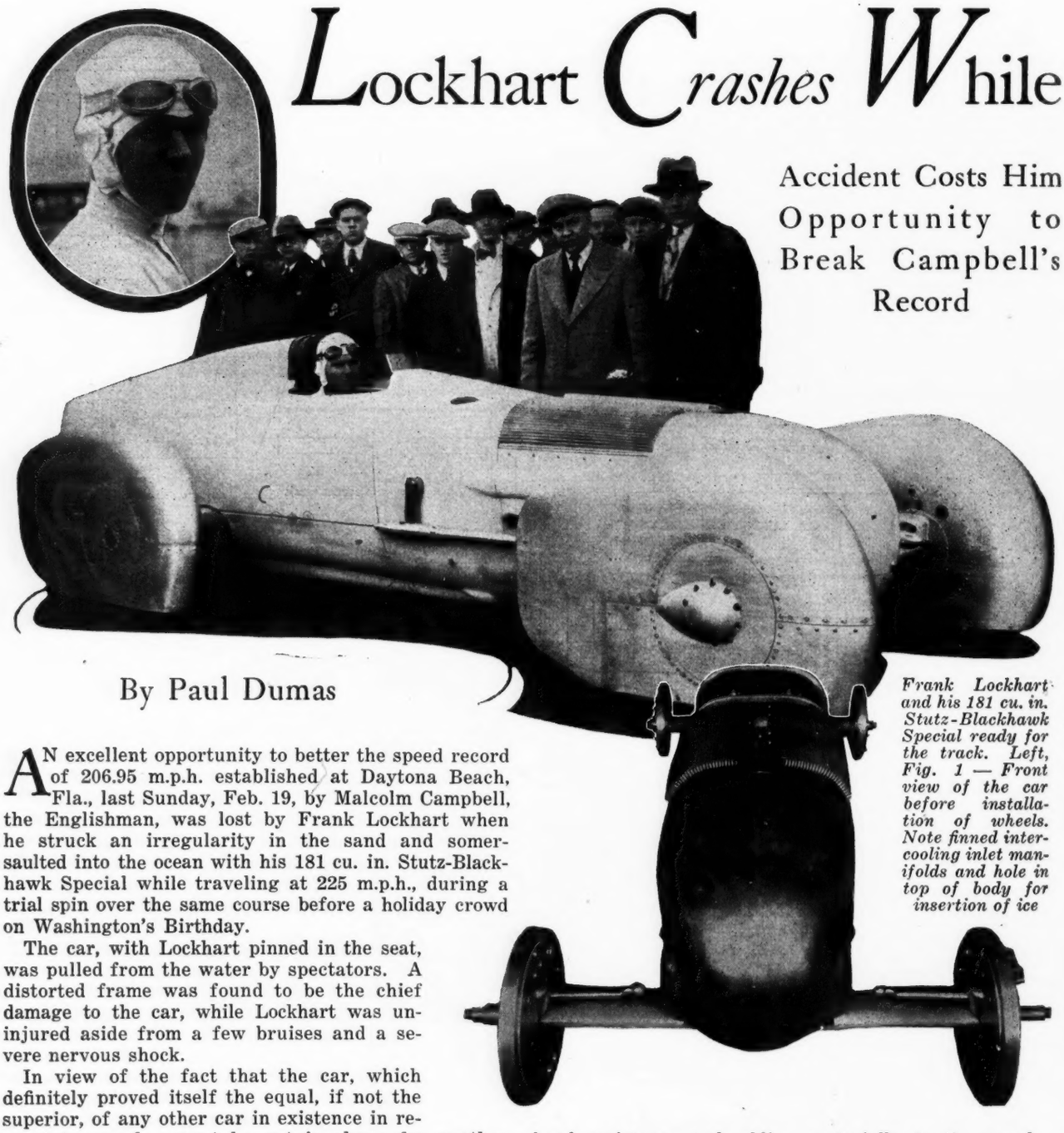
DENMARK has entirely revised its automobile laws during the past year, including the laws relating to motor vehicle taxation. Three taxes must now be paid by motorists, an excise tax payable when the car is being registered for the first time; an annual registration tax based on the weight of the car, and a gasoline tax at the rate of 7 oere per liter (about 7 cents a gallon). The tax is levied when the gasoline is imported. Gasoline can be produced in the country only with special permission of the Minister of Finance, and the tax on locally produced gasoline is levied at the points of production. For export and for uses other than in motor vehicles the tax is refunded. It is expected that the cost of collecting the tax will not exceed 1½ per cent.

DURING 1926, Italy manufactured 64,760 automobiles, as compared with 39,483 in 1925. Of this total the Fiat firm produced 54,600 or about 85 per cent, corresponding to a daily production of 180 cars.

Automotive Industries
February 25, 1928

Lockhart Crashes While

Accident Costs Him Opportunity to Break Campbell's Record



By Paul Dumas

Frank Lockhart and his 181 cu. in. Stutz-Blackhawk Special ready for the track. Left, Fig. 1 — Front view of the car before installation of wheels. Note finned intercooling inlet manifolds and hole in top of body for insertion of ice

AN excellent opportunity to better the speed record of 206.95 m.p.h. established at Daytona Beach, Fla., last Sunday, Feb. 19, by Malcolm Campbell, the Englishman, was lost by Frank Lockhart when he struck an irregularity in the sand and somersaulted into the ocean with his 181 cu. in. Stutz-Blackhawk Special while traveling at 225 m.p.h., during a trial spin over the same course before a holiday crowd on Washington's Birthday.

The car, with Lockhart pinned in the seat, was pulled from the water by spectators. A distorted frame was found to be the chief damage to the car, while Lockhart was uninjured aside from a few bruises and a severe nervous shock.

In view of the fact that the car, which definitely proved itself the equal, if not the superior, of any other car in existence in respect to speed, cannot be put in shape for another trial at this time, Campbell's 206.95 m.p.h. will stand as the official world's record. The record was previously held by Major H. O. D. Segrave, another Englishman, who clicked off 203.79 m.p.h. in a Sunbeam Special at Daytona last year.

Before Lockhart arrived at Daytona it was prophesied by many experts that the car which he had designed and built with the assistance of a syndicate headed by F. E. Moskovics, president of the Stutz Motor Car Co. of America, would surprise the world with its speed. This prophecy had as its basis several considerations, outstanding among which were the race-car-designing ability of Lockhart, the very high-grade engineering and manufacturing cooperation accorded him by those associated with the project, and the success which attended the efforts to reduce frontal area to a minimum, thus reducing head resistance and adding materially to the speed.

Unlike most speed creations, where the idea is transposed from the brain direct to the lathe, this job had gone through the Lockhart and contributing shops in the most approved manner. After negotiations for the financing of the project had been completed, which was last spring, Lockhart immediately hired two first-class draftsmen. These men toured the racing circuit with him, being engaged all the while in making up the assembly drawings, which were followed by complete detail drawings of each part. A careful double check of every one of the several hundred drawings was made before any prints were sent to contributing shops and manufacturers. The amount of study and ingenuity devoted to this part of the job is manifested in the unusual compactness of the various assemblies. Every part shows workmanship of the highest order and every casting, forging, and stamping is finished all over and

Traveling at 225 M. P. H.

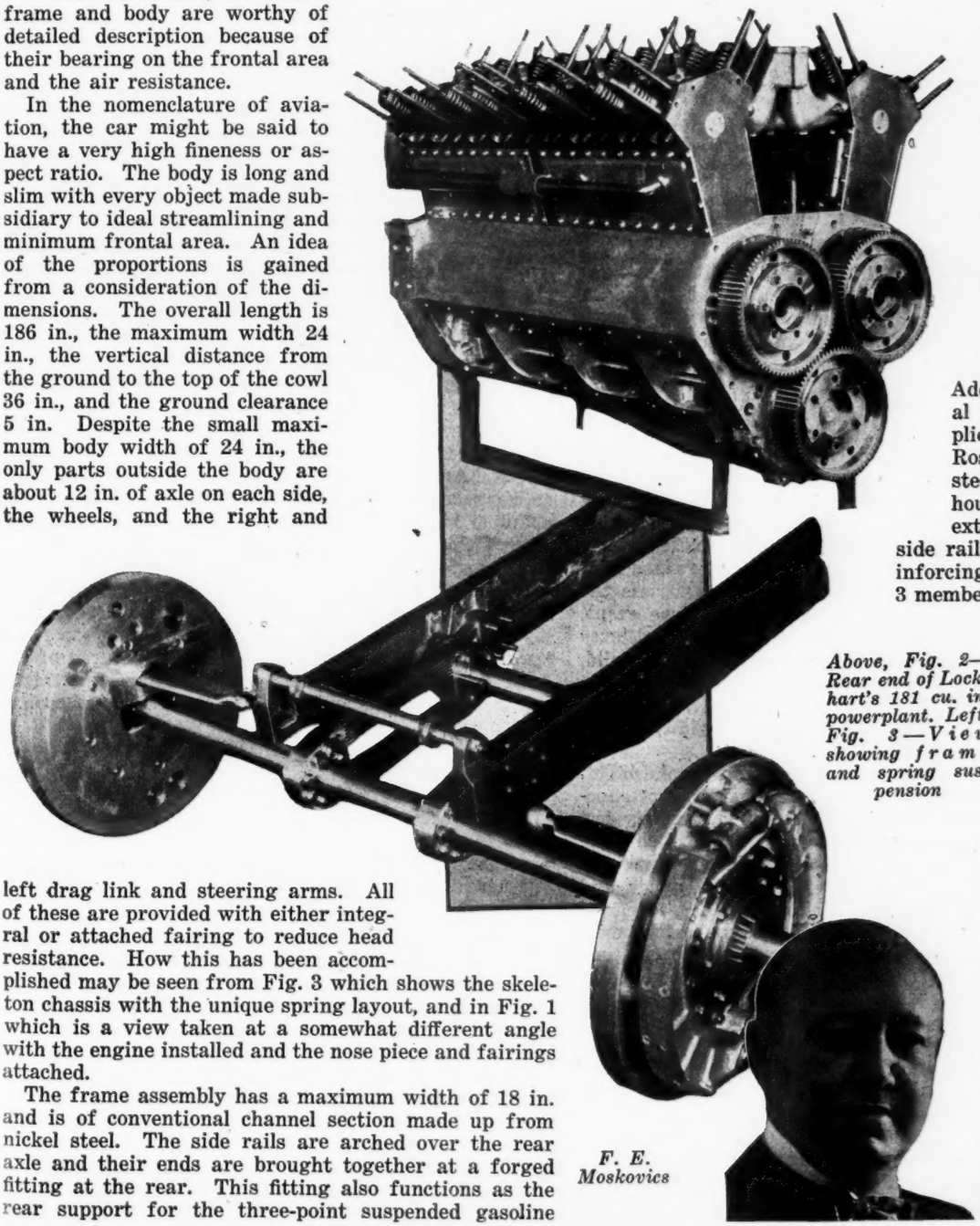
then either polished or plated in a high-grade fashion.

The job differs from the other challengers in many respects. It is, first of all, much smaller and considerably lighter, the fundamental dimensions being governed by the 16-cylinder, 30 deg. engine of 181 cu. in. piston displacement; by the space requirements of the driver, and by aerodynamical considerations that have to do with location of the center of gravity with respect to the center of pressure.

While there are many interesting features in the engine, spring suspension, steering system, manifolding, and worm-drive axle, the chassis frame and body are worthy of detailed description because of their bearing on the frontal area and the air resistance.

In the nomenclature of aviation, the car might be said to have a very high fineness or aspect ratio. The body is long and slim with every object made subsidiary to ideal streamlining and minimum frontal area. An idea of the proportions is gained from a consideration of the dimensions. The overall length is 186 in., the maximum width 24 in., the vertical distance from the ground to the top of the cowl 36 in., and the ground clearance 5 in. Despite the small maximum body width of 24 in., the only parts outside the body are about 12 in. of axle on each side, the wheels, and the right and left drag link and steering arms. All of these are provided with either integral or attached fairing to reduce head resistance. How this has been accomplished may be seen from Fig. 3 which shows the skeleton chassis with the unique spring layout, and in Fig. 1 which is a view taken at a somewhat different angle with the engine installed and the nose piece and fairings attached.

The frame assembly has a maximum width of 18 in. and is of conventional channel section made up from nickel steel. The side rails are arched over the rear axle and their ends are brought together at a forged fitting at the rear. This fitting also functions as the rear support for the three-point suspended gasoline tank. At the front end a forged fitting bolted to each side rail is extended upward to form a mounting for the solid round stock front cross-member. This member also functions as the stationary element of the Lockhart-designed friction type shock absorber, which damps spring rebound in the same manner as the Hartford device, although the motion is vertical rather than in an arc of a circle. There are four cross-members, the one just described being No. 1. No 2 member, visible in Fig. 3, is a nickel steel tube of approximately 3 in. diameter, which is flanged at both ends to provide the rear mounting for the front double cantilever springs and bolted to the bronze front engine support brackets. The engine has four-point suspension which, of course, provides for considerable frame rigidity. Additional torsional rigidity is supplied by the duplex Ross cam and lever steering gear, the housing of which extends across the side rails to form a reinforcing member. No. 3 member is a steel tube which also serves as the front support for the rear double cantilever springs. No. 4 is a solid round bar of the approximate dimensions of No. 1 and also serves the additional function of stationary element for the shock absorbers on the rear springs.



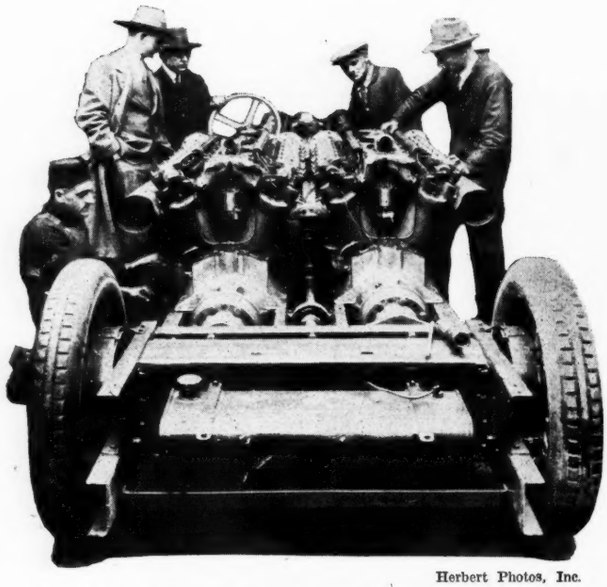
Above, Fig. 2—Rear end of Lockhart's 181 cu. in. powerplant. Left, Fig. 3—View showing frame and spring suspension

F. E. Moskovics

Bolted to the top and sides of each side rail are the three U-sec-

tion bulkhead rings. The all-steel body attaches to these rings and to angle iron strips bolted to the frame side rails.

Constructionally, the three-piece, all-steel body follows closely the bodies used on Duesenberg and Miller 91 cu. in. racing cars. The nose piece forms a separate assembly. It covers the front end of the frame and the springs and extends rearwardly, overlapping the front end of the two Lockhart intercooling inlet manifolds. These manifolds are intricate aluminum castings and are finned over their top portions and curved to the same radius as the body nose and cowl piece. Owing to their shape and location they serve also as the engine hood. The cowling and tail assembly pieces are conventional.



Herbert Photos, Inc.

Another challenger for speed honors at Daytona Beach is this monster, built by J. M. White of Philadelphia and described in Automotive Industries of Nov. 19, 1927. It is powered by three 12-cylinder Liberty aircraft engines. The fact that it has no reverse speed will prevent any records which it may make from being officially recognized

Even though the beach surface is literally glass smooth, a rigid attachment of the axles to the frame would be dangerous as the impact forces on the tires at such high speed could not be handily calculated. As a safety measure it was decided to equip the car with chassis springs.

It was also realized that the side thrust forces of any spring installation would be exceptionally high. To mount conventional springs well out toward the axle ends so as to secure maximum lateral rigidity and resistance to side thrust would greatly add to the frontal area. It was then decided to mount the springs inside the frame rails. But springs of conventional construction probably would not be adequate from the standpoint of lateral rigidity even though they might possess the desired vertical deflection characteristics. The result was the development of an integral double cantilever spring. This spring, although very expensive to build, appears to have the ability to withstand tremendous side thrust without flexing laterally. This is very important, because a lack of front end rigidity would make steering recovery difficult.

The springs shown are machined from the solid billet. All four are of the same dimensions and have an effective plate length of 10 in. Each spring assembly has the general shape of a rectangle with rounded corners. The ability to deflect vertically is made possible with the integral construction by milling each upper and lower section with a 3/16 in. cutter, making, in effect, six upper and six lower plates or leaves. Both ends of the front springs are rigidly anchored to the axle and frame brackets. Owing to the use of a torque-tube-drive rear axle the rear ends of the rear springs are free to move on the axle housing.

The estimated speed of the car with 30x5 tires and a 2.83 to 1 rear axle ratio is 268 m.p.h. This performance calculation is based on certain speed standards established with Lockhart's 91 cu. in. Miller race car on the Dry Lakes in California. This 91-in. regular Miller race car, with several engine changes made by Lockhart, was timed in both directions for an official mile, and made an average of 164 m.p.h. The car which established this speed had a total frontal area of 8.82 sq. ft. which plus the interfering area of the rear wheels, 2.44 sq. ft. brought the effective frontal area to 11.26 sq. ft. (By "interfering" area is meant the forwardly projected area of the rear wheel, which although masked by the front wheels, is effective as air-resistance area because the rear wheels are so far to the rear of the front wheels.) A small scale model of this complete vehicle was then made and wind-tunnel-tested by Curtiss and the Army Air Service at Dayton. It was revealed in this test that the 91 cu. in. regular Miller-Lockhart car had a resistance coefficient of .0168 lb. $/(\text{m.p.h.})^2$. These two figures, the resistance coefficient of the complete car and the known speed, enabled Lockhart and his associates to figure back and determine the horsepower. This was found to be 200. The tests also provided a definite standard to work from in designing the new car.

Despite the fact that the present car has twice the horsepower of the 91-in. job, its total effective frontal area is only 10.85 sq. ft. The greatest improvement, however, was made in the streamlining of the new car, whose coefficient of wind resistance, according to Curtiss and Army Air Service figures, is .0061 lb./$(\text{m.p.h.})^2$, as compared to .0168 for the standard 91-in. car which attained 164 miles per hour. The estimated speed figure of 268 m.p.h. therefore is less theoretical than might appear.

The methods by which this small frontal area and very low resistance value were attained are partly explained in the foregoing description of the frame and spring suspension system. Additional features of the construction that have been contributory are the streamlining of the wheels and axles and the method of cooling the engine.

Streamlined Wheel Housings

It was learned in the wind tunnel tests that the regular disk wheels or wire wheels with disks attached constituted approximately 50 per cent of the total head resistance. This figure has been appreciably lowered in the new car until it is now approximately 30 per cent. The lower value was attained by the use of streamlined housings that practically inclose both the front and rear wheels except for about 5 in. at the bottom. It is interesting to note that the air resistance coefficient of each wheel with these housings is .000594, with the wheels at 0 deg. with relative wind. The large area of these housings compared to the body obviously meant a large increase in keel surface area, which would ordinarily increase its tendency to side-slip in a cross-wind. To reduce this tendency, additional studies and tests were made in the wind tunnel of the proper location for the center of pressure to give an automatic yawing action rather than a slide or skid. As now arranged, the center of pressure on the exposed surfaces of the chas-

sis causes the nose of the machine to point one deg. into the wind for a side wind of approximately 10 m.p.h. and about 2 deg. for a side wind of 15 m.p.h. velocity. Although no negative lift separate airfoil surfaces are used there is a total force of only 54 lb. tending to lift the front end of the car.

Perhaps the second most important structural innovation contributing to the very low head resistance coefficient is the elimination of the cooling system radiator. Cooling is provided by means of an ice pack contained in the nose piece of the body. Except for this feature the water circuit is conventional. The nose tank has a capacity of approximately 75 lb. of ice, which, in connection with the water that will be introduced into the engine jackets, provides 10 minutes full throttle running before the water will have reached 180 deg. Fahr. It is interesting to note that extensive tests made through the courtesy of General Gilmour at one of the Dayton (Ohio) Army Air Service fields showed that the smallest radiator adequate for the job would have a core 9 in. thick and would require between 75 and 100 hp. to drive it through the air at 225 m.p.h.

Axle a Three-Piece Tube

Considering the chassis units separately, it will be seen, by reference to the illustration, that the front axle is a three-piece tube split at the center for attachment to the front springs. The ends are reverse Elliott type and the entire assembly is of Timken manufacture equipped with Timken roller bearings. In the front axle, as in the other parts of the car, extreme rigidity is the keynote. The integral knuckle and steering arm assembly is a fine example of high grade workmanship. Since the car will be driven in an approximately straight path, the axle is given 10 deg. of positive castor. It is said that this castor angle produces a turning resistance at the steering wheel of 20 lb. The knuckle pins are mounted at a 13 deg. camber angle and provide center point steering with no wheel camber.

The engine is of Lockhart design throughout, except the four cylinder blocks purchased from Harry Miller. There are 16 cylinders arranged in two banks, each bank having its own crankshaft, though both are mounted on a common crankcase. The included angle between banks is 30 deg. Since no dynamometer is available for testing, it is assumed that the brake horsepower will be 385 at 7000 r.p.m., this calculation being based on the performance of Lockhart's 91 cu. in. engine which, figured back from the known resistance and the known speed, attains 200 hp. This 15 hp. reduction is meant to cover the losses in transmission.

The bore is 2 3/16 and the stroke 3 in., which is equivalent to 181 cu. in. piston displacement and an S.A.E. rating of 30.6 hp. The volumetric compression ratio is approximately 5.7 to 1, with 28 lb. gage pressure of supercharge at maximum output. Cylinders are of iron, cast in fours. Each crankshaft is carried on five main bearings, which consist of split bronze housings which are a push fit in the barrel-type aluminum crankcase (when the latter is warm), being held to it by flanges and bolts. The housings are lined with Federal Mogul babbitt. All main bearing journals are 1⅞ in. diameter.

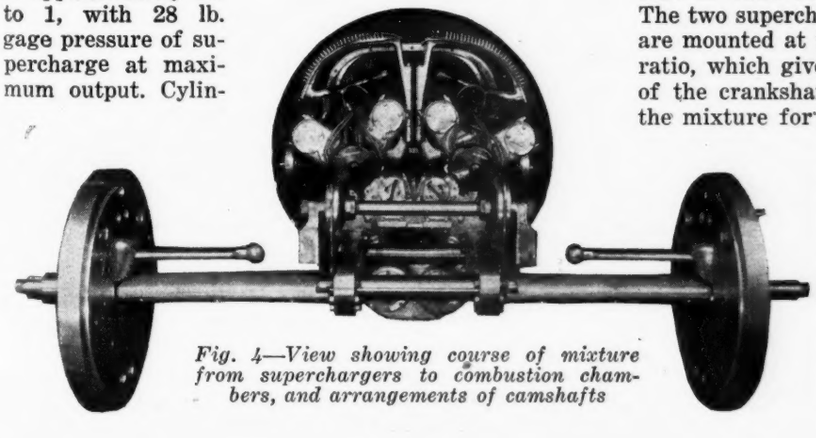


Fig. 4—View showing course of mixture from superchargers to combustion chambers, and arrangements of camshafts

Crankshafts are machined all over and equipped with counterweights. Crankpins on each shaft are arranged so as to give a firing order of 1,5,3,7,4,8,2,6. Two cylinders are fired simultaneously, the order being No. 1 left with No. 8 right, No. 5 left with No. 2 right, etc., so as to reduce any tendency towards a rocking couple.

Connecting rods are of chrome-nickel steel, tubular in section, with a center-to-center length of 6 in. The big end bearings of 1.689 in. diameter are gravity poured, the babbitt being hand-tamped for density during pouring. The eye end of each rod is fitted with a hardened steel bushing which carries a ⅝ in. tubular piston pin. The pin floats in the rod bushing and in the unbushed bosses of the Lynite piston, being restrained endways by means of a soft metal plug at the outer end of each boss. The pistons are made from No. 122-7 alloy of the Aluminum Co. of America and are heat-treated. Each piston weighs approximately five ounces stripped. There are three rings per piston, the two upper being of approximately 1/16 in. width and the lower, which is an oil ring located above the pin, of ⅛ in. width.

Four overhead camshafts, provided with 10 bearings each, are driven by four trains of spur gears mounted on ball bearings. Valve actuation is similar to that on Miller and Duesenberg race cars, being direct with a thin-walled steel cup serving as an intermediary member between cam and valve stem. These cups are guided in the aluminum camshaft housing and take all side thrusts. The camshafts and their housing assemblies are bolted to studs secured in the top of the non-detachable cylinder heads. There are two valves per cylinder, mounted at an included angle of approximately 30 deg. It is interesting to note that both the inlet and exhaust valves (which have a diameter of 1 3/16 in.) are of chrome-nickel steel put through a special heat treatment. They are mounted in self-aligning valve stem guides and have a tappet clearance of .026 in. Valve timing is nearly conventional, the inlet opening five deg. before T.D.C. and closing 38 deg. after B.D.C., the exhaust opening 35 deg. before B.D.C. and closing 8 deg. after T.D.C.

Two Carburetors Used

Two Lockhart-Zenith special downdraft-type carburetors are used. One of these is connected to the inlet side of each of the two impeller-type superchargers. The two supercharger assemblies (with 3-in. impellers) are mounted at the rear and are geared at a 5.35 to 1 ratio, which gives an impeller speed of 37,450 at 7000 of the crankshaft. After passing through the blower the mixture for each block is directed forward, where it enters a flat funnel-shaped header on the under side of the intercooling manifold. From the header the mixture passes up through the manifold casting, which is approximately three ft. long and has a developed width of about 18 in. This portion of the manifold has cast-on cooling flanges to increase the cooling effect on the oil passing through it. After traversing the ribbed portion of the manifold,

the mixture makes a 90 deg. turn and enters the downdraft vertical part of the manifold, where it again makes a 75 deg. turn into the inlet ports of the cylinders. It is interesting to note that these twin manifold castings were delivered 10 days after the manufacturer received the blueprint and that the approximate cost was $3,400. The mixture velocity at the inlet ports is 18,000 ft. per minute. Among the auxiliary units on the engine are the two Delco-Remy eight-cylinder distributors which are driven from an extension on one of the idler gears for each bank. Each distributor fires eight cylinders and is provided with its own coil. A feature of the construction is the four-lobed cam which, instead of being held in place on its shaft by friction or a key, is provided with teeth on its lower face which engage with similar teeth on a facing flange on the shaft. The rotor is balanced and distribution of the high tension sparks is across an air-gap between the rotor contact and the cover terminal. The single spark plug for each cylinder is located directly in the center of the combustion chamber and screws into a thin-shelled bushing which is surrounded by the jacket water. The tension of the interrupter arm spring is 1½ lb.

A water pump is provided for each bank and is driven by an extension on the end of the corresponding crankshaft. These pumps are equipped with a spring-loaded packing gland which provides an automatic take-up or tension effect. Except for the fact that ice is used in the nose tank, the cooling circuit is conventional.

How the Cars Compare With Each Other and With Segrave's Sunbeam

	Stutz-Blackhawk Spl.	Campbell-Napier "Bluebird"	J. M. White's "Triplex"	Segrave's Sunbeam
Total piston displacement	181 cu. in.	1360 cu. in.	4950 cu. in.	2760 cu. in.
Wheelbase ..	112 in.	145¼ in.	175½ in.	141 in.
Weight	3000 lb.	5600 lb.	8000 lb.	8000 lb.
Brake hp. ..	385	900	1200	1000
No. of cyls..	16	12	36	24
Bore	2 3/16 in.	5½ in.	5 in.	4 13/16 in.
Stroke	3 in.	5⅛ in.	7 in.	5 5/16 in.
Tire size ...	30 x 5	35 x 5	36 x 6.5	36 x 6.75
Power-weight ratio.	7.8 lb per hp.	6.22	6.66	8.0

Low Straight Drive

The main reason for using two crankshafts was to secure a very low yet straight drive line to the rear axle. As will be seen by reference to Fig. 2, there is a very wide-faced spur gear, bolted to a flange on the rear end of each crankshaft. The driven gear mounted below is supported on two very large, inboard-mounted ball bearings. No flywheel is used, the multiple disk clutch of 5⅞ in. diameter being mounted on the end of the driven gear. The clutch, designed by Lockhart, has four driving and four driven disks; it was built by the Rockford Drilling Machine Co. and is featured by a positive drive "lock-in" device, which relieves the facings of all torque loads. The positive clutch consists of an internal and an external gear. The first part of the clutch pedal forward motion unmeshes these two gears and the last two inches of movement serves to compress the clutch spring, which allows engagement of the transmission gears. When the pedal is released, the friction clutch first picks up the load, which is then, during the last part of the release motion, transferred to the internal-external toothed positive clutch.

The car has a uniform ground clearance of 5 in. from the front of the crankcase all the way back to the bottom of the worm housing. To secure this effect it was necessary to mount the countershaft of the Detroit transmission above the main shaft. Unlike most race cars, the countershaft on this job revolves when the transmission is in the direct drive position, but its top mounting eliminates considerable of the losses that would occur if it were churning the gear case lubricant.

Drive from the tail shaft of the transmission is by means of a forged propeller shaft of 2¼ in. outside diameter, on the front end of which is mounted a Mechanics metallic - type universal joint. The propeller shaft forging is drilled its full length, then reamed and lapped inside and out, the finished job having a wall thickness of 3/16 in. A bronze plate bolted to the rear of the transmission provides the seat for a spherical mounting at the forward end of the torque tube. The torque tube has its telescoping joint at the front end, and a similar provision is made on the propeller shaft at its rear end.

The rear axle is of the under-mounted worm-type, of Timken manufacture, and equipped throughout with roller bearings. In this unit, as in others of the car, no attempt was made to save weight if such saving tended to reduce the high degree of rigidity desired. The housings are malleable and finished all over. Each end housing is equipped with a pressed-in steel tube which surrounds the unusually heavy driveshafts, which have the hub formed integral with them. The shafts are solid and measure 2¾ in. in diameter at the small or splined end. The axle at present is equipped with a 2.83 to 1 reduction, the worm having six leads and the wheel 17. Wheels of 16 and 18 leads are carried, and may be used in later experimental runs. Since such worm speeds as 7000 had not been previously encountered it was necessary for the axle builders to do considerable experimental work. It is estimated that the thrust load on the worm shaft bearings at full throttle is in excess of 2100 lb. With the first worm shaft bearing installation it was found that less than three minutes of full speed caused the rollers to turn blue from the heat. A change in the angle of the rollers has enabled the shaft to be revolved at the same speed with full load several hours, with a maximum temperature at the bearings of only 180 deg. Fahr.

All wheels are of the disk type, of extremely heavy construction. They were made by the Motor Wheel Co. and carry special straight side rims. The outer rim flange is bolted on by 18 nickel steel retaining screws of ½ in. diameter. This is a safety measure, providing against accident in case of a puncture or blowout. For the same reason each rim carries six heavy tire bead retaining lugs of substantially the same design as used with the old-time bolted-on type of tires. The wheels are detachable at the hub, and the outer plate of the latter is of such large diameter that only about 4 in. of the wheel disk extends beyond the hub plate to the inner edge of the rim.

30 by 5 in. Tires

The tires are 30 by 5 in. The writer was present during some tests on one make of tire. On this, as on the other makes, it was learned that at 3000 r.p.m. of the wheel corresponding to 268 m.p.h., the valve cores were forced into the inner tube. This trouble was

solved by the use of right angled valve stems. Measurements were also made of the amount of increase in tire diameter brought about by the centrifugal forces acting at high speeds. At 3000 r.p.m., which was used as the standard test speed, the tire with 100 lb. air pressure showed a total increase in diameter of 1⅜ in. When run with no air the same 30 by 5 tire showed a total diameter increase of well over 5 in. It is interesting to note that on all tires tested the air pressure reading after a three min. run dropped off five lb. After the second test there was a further drop of two lb. Whether this is due to an increase in the interior volume of the tire due to stretching of the cords, or whether it is caused by a slight leak at the valve during rotation, is not known. Both two and six-ply tires were tested. The beads of these special tires obviously are reinforced and the tread rubber is only 1/16 in. thick.

The steering gear is a duplex cam and lever type of Ross manufacture. It comprises a large aluminum housing which extends across the frame from one side rail to the other, being mounted at each end in concave convex pillow block hangers. Inside this housing there are two camshafts or worms, each mounted in ball bearings. Each cam has its own trunnion and drop arm. The left-hand drop arm is connected to the left-hand knuckle arm by a long straight drag link. The right-hand drop arm on the other side of the frame is connected to the right knuckle arm by its own long straight drag link. This construction eliminates the use of the tie rod, provides an easy installation for a center mounted steering column for a one-man car, and is said to provide a better geometrical layout. The steering reduction ratio is 18.5 to 1.

Lockheed internal hydraulic brakes are fitted to all wheels. The front wheel shoes are operated by a hand lever, the rear shoes by the conventional pedal. A separate master cylinder is provided for front and rear wheel brakes. Each brake element consists of two light alloy shoes provided with an eccentric adjustment at the top for clearance, and two eccentric anchors at the bottom for centering to the drum circle. Shoes are lined with Hycoe asbestos woven lining. The brake drums, machined from the solid, are of massive construction and are 16 in. in diameter and three in. in width. For purposes of rigidity and also to increase the heat-storing capacity, the wall thickness is ¾ in. measured from the tip of the cooling fins to the inside surface against which the lining contacts. Some idea of the extreme ruggedness of these unsprung parts can be gained when it is realized that the drum assemblies average 57 lb. each, stripped. The operating fluid is a special mixture with extremely low expansibility under high temperatures.

The fact that 76 New Departure ball bearings are incorporated in the car gives some idea of the extremes to which Lockhart has gone to eliminate friction between moving parts, thus insuring easy running and maximum speed.

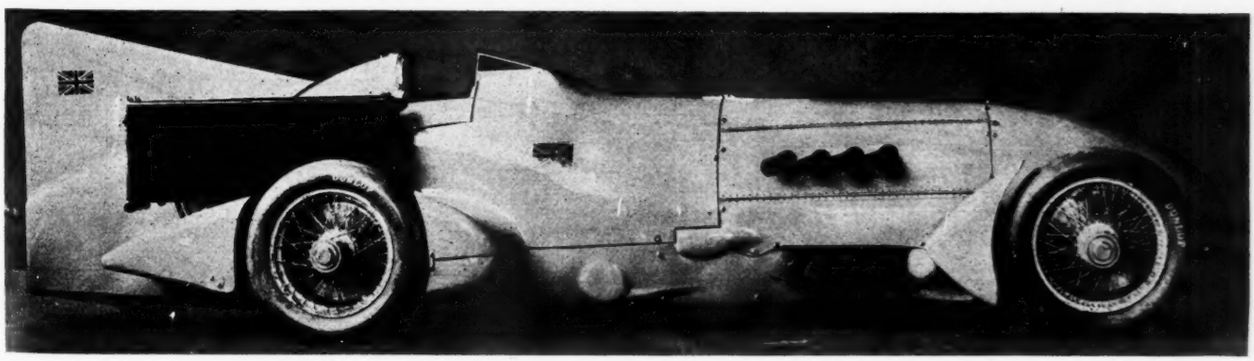
Details of Campbell's Engine
British Admiralty Secret

Same as used in seaplane which won Schneider Cup race last year. Has 12 cylinders and 10 to 1 compression.

By M. W. Bourdon

SUCH information as has been made available concerning the construction of Captain Malcolm Campbell's car omits details as to the engine; the latter is still on the secret list of the British Admiralty, for it is identical with the engine used in the seaplane that won the Schneider Cup race last year. It can be said, however, that it is of the "W" type made by Napier, with 12 cylinders arranged in three rows, the central block being vertical and the other two, one on either side, at an angle of 60 deg.

The bore and stroke are 5½ in. by 5⅛ in. (140 mm. by 130 mm.), giving a piston displacement of 1360 cu.



Side view of the "Bluebird Special," in which Captain Malcolm Campbell, of England, set a new world's speed record of 206.95 m.p.h. at Daytona Beach, Fla.

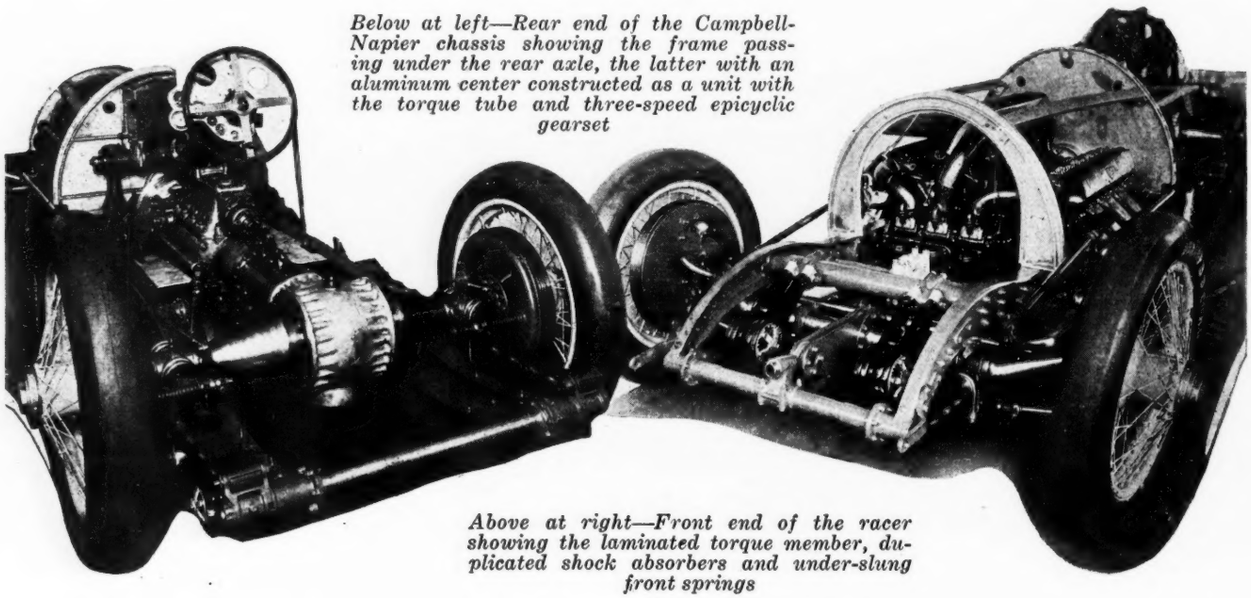
in. Overhead camshafts are used, and supercharging with a compression ratio of over 10 to 1, necessitating the use of doped fuel.

The actual power developed is not made known, but it is said to be double that of the engine of Campbell's racer on which he averaged 183½ m.p.h. on the sands at Pendine in Wales; that engine developed 450 b.hp. at 2000 r.p.m. and 502 b.hp. at 2200. Moreover, improvements in streamlining the body are said to have reduced the power required to drive it at 230 m.p.h. from 1100 hp. to 700 hp., while, during, a series of tests of models by the chief airplane designer of Vickers in their wind tunnel, it was found that by providing fairings for the wheels a further saving of 80 hp. could be secured.

type dished for center-point steering, while the rear ones are triple-spoked. Tire sizes are 33 by 5 in. and 35 by 5 in. front and back respectively, with an inflated width of 5.85 in. In racing trim the car weighs 2½ long tons and is expected to put the speed record up to 220 m.p.h., if not higher.

Apart from the engine there is no standard component in any part of the chassis, for the whole of the transmission, axles, etc., have been specially made, its construction being an entirely personal affair of Captain Campbell, though he has received practical assistance from many British automobile firms, steel manufacturers and others.

The transmission consists of a dry multiple-plate clutch with 16 friction surfaces, the plates having a



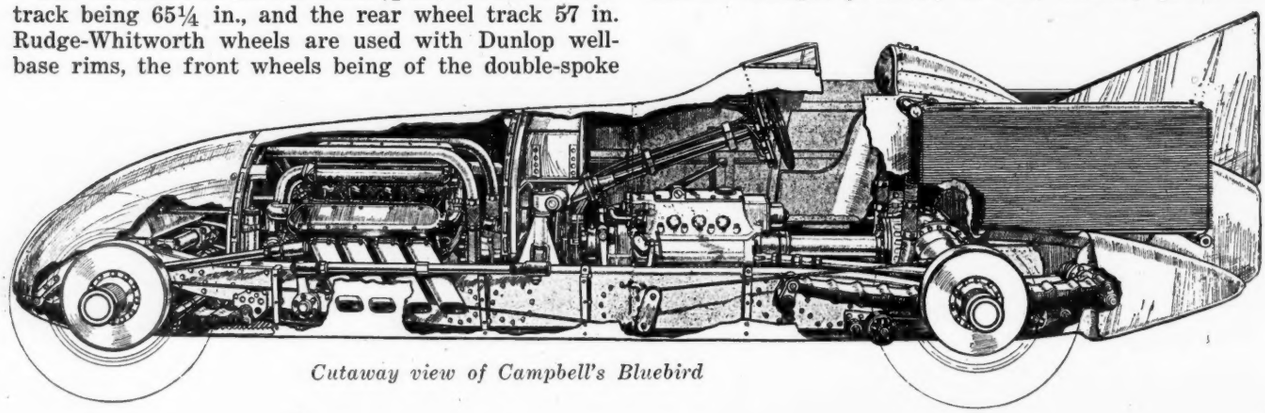
Below at left—Rear end of the Campbell-Napier chassis showing the frame passing under the rear axle, the latter with an aluminum center constructed as a unit with the torque tube and three-speed epicyclic gearset

Above at right—Front end of the racer showing the laminated torque member, duplicated shock absorbers and under-slung front springs

The engine is supported on a subframe with a three-point suspension in the main frame, the latter being underslung from the rear axle and of the usual channel steel construction, with side members approximately 12 in. deep throughout part of their length. A notable feature lies in the position of the radiators, for these, instead of being at the front of the car, are at the back, two pairs being arranged longitudinally, one at each side of the gasoline tank in the tail. The fuel tank has a capacity of 20 gal., while the oil tank for the dry sump lubrication is in front and has a 10 Imperial gallon capacity.

The wheelbase of the car is 145½ in., the front wheel track being 65¼ in., and the rear wheel track 57 in. Rudge-Whitworth wheels are used with Dunlop well-base rims, the front wheels being of the double-spoke

mean diameter of 11¼ in. The casing of the clutch forms the driven member, to which a 13½ in. diameter flexible joint conveys the drive to a short coupling shaft with a spherical bearing in a cross-member of the frame. This latter joint is attached directly to the primary shaft of the gearbox, which is of the epicyclic type providing three speeds and reverse with the following ratios: first speed, 1 to 0.333; second, 1 to 0.666 and top direct. The gearset differs notably from the usual epicyclic arrangements, for, although no clear details are available, it is said that frictional braking surfaces for obtaining torque are eliminated and the satellite carriers brought positively to rest, whereby power is



Cutaway view of Campbell's Bluebird

transmitted without frictional loss, while every unit of the gear runs on roller bearings.

Lubrication of the gearset is effected by pressure from the engine. Integral with the gearset is a short torque tube, flange-jointed to the aluminum center of the rear axle casing, in which the crown wheel and bevel with a ratio of 1.5 to 1 are independently supported with the object, it is stated, of making them unaffected by deformation of the axle casing. The axle is of the full floating type with conical extensions of the center formed from steel forgings and diagonal tie-rods running from the spring centers to the gearset.

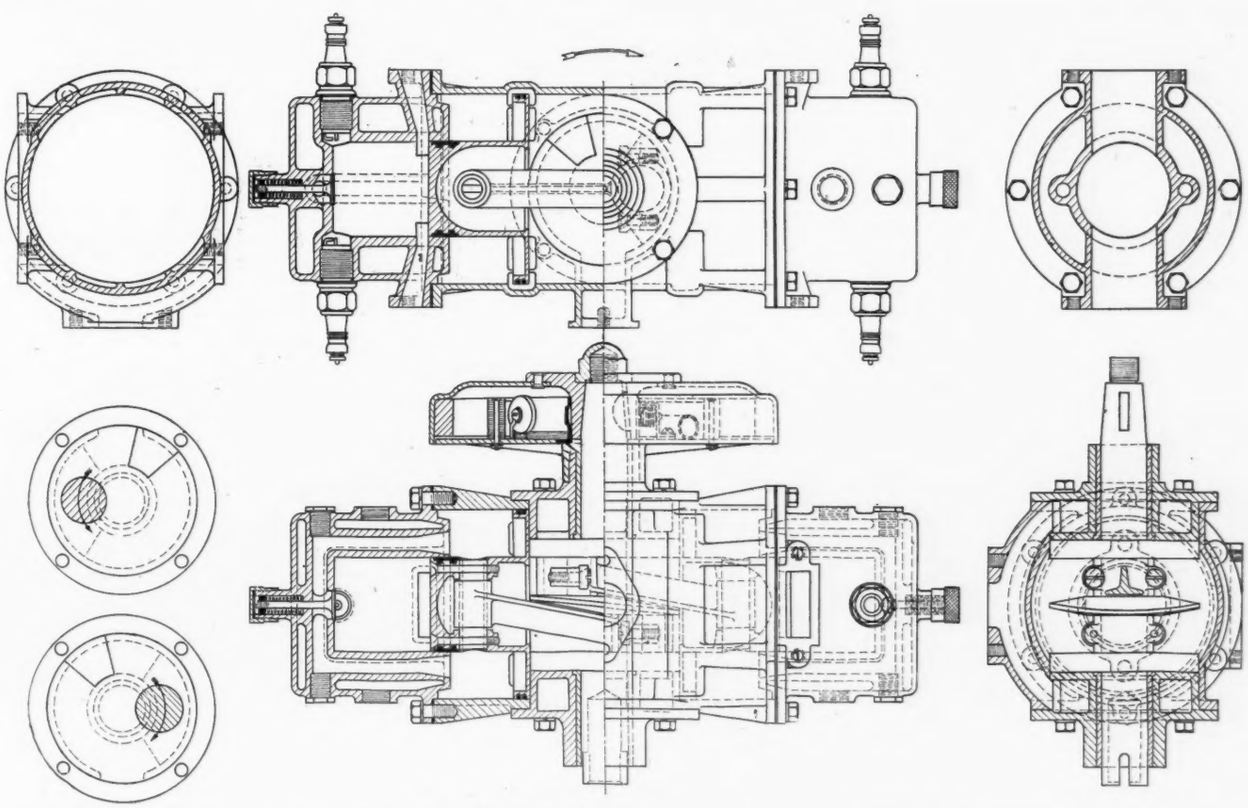
The front axle consists of two sections, flange-jointed at the center from which a laminated torque member runs forward to a tubular cross-member at the front end of the frame, the object being to relieve the springs of front brake reaction stresses. Semi-elliptic springs are used front and back, their respective lengths being 37 in. and 50½ in. The steering gear is of the Marles cam type, duplicated, with direct operation of both front wheels, though a tie-rod is also used. Front and rear brakes are identical in design and dimensions, being of the Rubery type, the drums having a friction surface of 18 in by 1⅝ in. with cooling fins. Brake operation is assisted by a Dewandre vacuum servo, with both hand lever and pedal control.

The design of the shell of the car is shown by the accompanying photograph, in which it will be noticed that a fixed vertical fin occurs behind the driver, the object of which is to give increased directional stability.

Two-Stroke Engine Operates on "Super-Cycle"

WE reproduce herewith some drawings of a two-stroke, supercharged, two-cylinder opposed engine designed by H. P. Van Keuren of Lansing, Mich., for use as an outboard marine engine, and particularly for racing purposes. The engine operates on what Mr. Van Keuren calls his super-cycle, compressing the charge first in the crankcase, then in two pumping chambers concentric with the working cylinders, and finally in these cylinders. The pistons are of the stepped or double diameter type, the portion in the working cylinders having a diameter of 2½ in. and that in the pump chambers a diameter of 5 in. (the stroke being 2 in.). As the displacement of the crankcase charge pump is four times that of the working cylinders, the engine has a theoretical supercharging ratio of 4 to 1, but evidently the volumetric efficiency of the charge pump is rather low, for otherwise it would be impossible to use a compression ratio of something like 4 to 1 in the cylinders, as indicated by the drawings.

Mr. Van Keuren claims an output of 30 hp. at 3200 r.p.m. from this 19.6 cu. in. engine which weighs only 52 lb. With the construction employed, in which the two cylinders are co-axial, the balance should be very good. This being a racing engine, the primary object evidently has been to secure the maximum power from an engine of given weight, and problems of engine life have received less attention. The very small effective bearing surface on the piston when near the end of the stroke would lead one to expect rather rapid wear, and the offset between the bearings at opposite ends of the connecting rods also would be likely to result in uneven and rather rapid wear.



Sectional views of Van Keuren two-stroke, supercharged engine

Schebler Offering New Carburetor Of Air-Valve Type

Single air inlet to carburetor facilitates preheating of air and use of air cleaner if desired. Two inlets provided to mixing chamber. Rich mixture at idling speed.

By P. M. Heldt

A NEW Schebler carburetor, the Model U, has been placed on the market recently by the Wheeler-Schebler Carburetor Co., Indianapolis, Ind., and will be standard equipment on a good many cars of this year's production.

Like the Model S, it is of the air-valve type. As may be seen from the accompanying sectional view, while there is only one air inlet to the carburetor—which facilitates preheating of the air and the use of an air cleaner if desired—there are two air inlets to the mixing chamber, one through the venturi and the other through the air valve *Y*. The air valve is held to its seat by a long, low-rate spring. While the engine is idling, air passes into the mixing chamber only through the venturi, but once the degree of vacuum in the mixing chamber exceeds a certain value, the air valve begins to open, and it does not take a very much greater suction to open it completely.

When idling, a comparatively rich mixture is formed in the venturi, which passes on into the inlet manifold undiluted, and a rich mixture is, of course, quite desirable for starting and idling. On the other hand, when the throttle is fully or nearly fully open, the air valve is held open by the stronger suction, and the air entering through it mixes with the combustible mixture formed in the venturi tube as this mixture emerges from that tube.

It can be seen that the air passage at the throat of the venturi is quite small, whereas the area of the air valve when fully open is quite large. Thus the air inlet area to the mixing chamber expands as the demand on the carburetor increases and the velocity of air flow through this area does not have to vary much between idling and full load, which is expressed by the manufacturers by saying the carburetor has a long range.

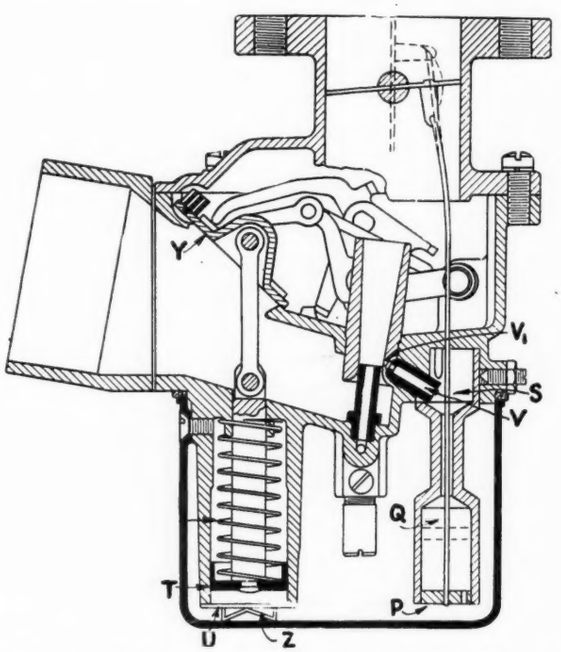


Fig. 1—Section through carburetor showing air valve, dashpot, venturi, accelerating pump and throttle

Gasoline enters the float chamber through a gauze strainer and through the float valve, the action of which is controlled by the usual float. The entrance of the fuel to the spray nozzle is controlled by the needle valve M (Fig. 2) having a seat in a tubular insert in the body of the carburetor. From the needle valve chamber the fuel passes to the base of the nozzle through a cross drill hole N (Fig. 3).

When the air valve *Y* is lifted from its seat by the increasing suction, this motion is reduced and transmitted to the needle valve *M* by the single-armed lever *X* (Fig. 2) fulcrumed at *K*. Lever *X* is made of hardened steel and plated, and it has large bearings considering the small weight supported by it, which gives assurance that the metering characteristics of the carburetor will not change perceptibly with age. The effect of the interconnection between the air valve and the needle valve is to increase the flow of fuel in proportion to the suction in the mixing chamber, which is required because of the increase in the air inlet area. Looking at the matter from a different angle, the gasoline metering area is increased with the air metering area.

The new carburetor is provided with an accelerating pump which supplies a rich mixture temporarily when the throttle is suddenly opened. For regular running the carburetor is adjusted to give a lean mixture for the sake of economy, and it is a characteristic of all simple spray carburetors that if the throttle is suddenly opened, the mixture is leaned down still further, on account of the greater inertia of the fuel column as compared with the air column. This often leads to missing under these conditions.

The accelerating pump *Q* (Fig. 1) comprises a cylinder in which there is a piston *P* that is connected by a flexible link to the throttle disk.

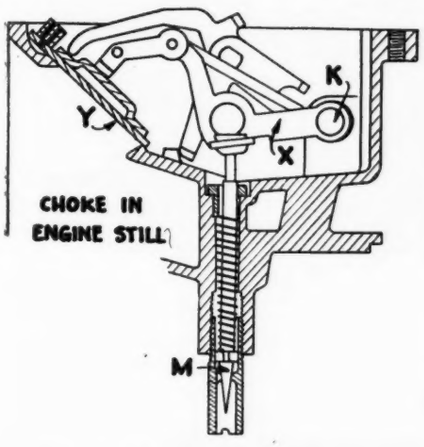


Fig. 2—Showing connecting passage from needle valve chamber to spray nozzle

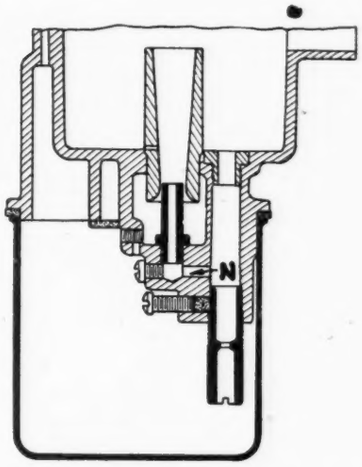


Fig. 3—The needle valve and its interconnection with the air valve

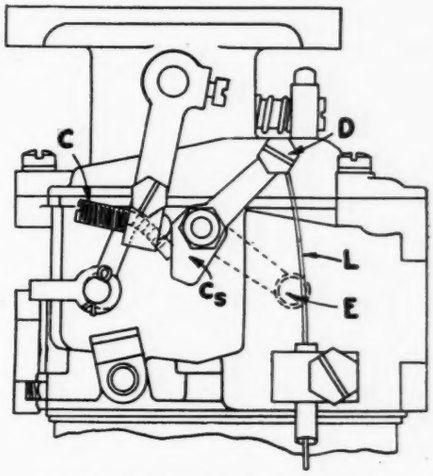


Fig. 4—Dash control and starting cam

When the throttle is opened the piston is raised in the cylinder of the pump and gasoline is transferred from the pump cylinder to the upper chamber *S*, whence it is drawn into the venturi directly above the mouth of the nozzle through the passage *V*. Fuel enters the pump cylinder through a small hole in its piston. The pump is made of large capacity, so that there may be sufficient extra supply of fuel if the engine is running under considerable load and the throttle is moved through only a few degrees. The surplus transfer of gasoline to the upper chamber *S* when there is a large movement of the throttle valve is taken care of by an overflow at the required height, draining back into the float chamber.

It has been found that the amount of extra gasoline for acceleration required by different engines varies with the size, shape and heat of the intake manifold, and the rate of delivery of extra gasoline can be varied by varying the size of the metering orifice V_1, while the total amount delivered can be varied by varying the height of the overflow hole.

Air Valve Has Dashpot

As shown in Fig. 1, the air valve *Y* is provided with a dashpot *T* which serves to prevent fluttering of the valve when the engine is pulling hard at low speed. The relief valve *U* is held up against the bottom of the dashpot cylinder by the spring *Z* and allows the gasoline to flow out of the cylinder when piston *T* is lowered as the air valve closes. When the air valve opens it raises piston *T*, and the relief valve *U* is closed, hence the piston can rise only slowly, since the gasoline must leak past it.

The Model U carburetor has no choke valve, but a dash control is provided to enrich the mixture for starting. This dash control, which acts through the wire *L* (Fig. 4), moves the lever *D* into the position *E*. This lever is mounted on the pivot shaft *K* of the lever *X*, and the result is that the gasoline needle valve is lifted further and the air valve *Y* is clamped down to its seat. Thus a richer mixture is fed for starting, but the enrichening effect automatically decreases as the engine gains speed, which is as it should be, as it takes less rich mixture to keep a cold engine running at high than at low speeds.

A feature of the carburetor is the starting cam *Cs*, which forms part of the dash control lever *D*. When the dash control is pulled out for starting, this cam automatically moves the throttle into a position which permits easy starting. Then, as the dash control is pushed in after the engine has picked up, the throttle opening is gradually diminished to the normal position for idling. If the dash control is left part-way out for "warming up," a fast idling speed is obtained, which is of advantage when the engine is quite cold.

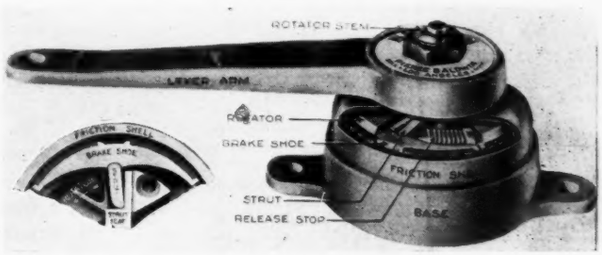
Baldwin Shock Absorber

A NEW shock absorber has been developed by Pierce Baldwin, Los Angeles, which is designed to control spring rebounds but which also presents a degree of control for the compression movements.

It consists of two main elements, a stationary member consisting of the friction shell and its base, and a movable element containing the rotator and lever arm.

Movement of the lever arm actuates struts which force the brake shoes against the friction shell. Movement of the struts is limited by resilient stops which develop resistance in the absorber for damping compression movements in the springs.

The braking units comprise a shoe, a strut and a strut seat. The struts straighten, or assume a radial position, in proportion to the velocity of movement in the rotator, thus proportioning the retarding effect of the absorber to the roughness of the road or the rate of travel. Close contact between the friction members is obtained by means of a spring while a secondary



Baldwin shock absorber and detail of braking mechanism

spring can be utilized to regulate the damping effect.

The illustration shows a general view of the new absorber with the major parts named and a detail view showing the operation of the struts in forcing the brake shoes against the friction shell.

Just Among Ourselves

Buying Luxuries Instead of Staples

OPTIMISTIC members of the industry have long contended that people will continue to buy automobiles and accessories even when they are somewhat hard pressed for money; that other expense items, once regarded as the only necessities, will always be cut down before the purchase of a new car or of much-wanted accessories is withheld. Beetle-browed logicians have frowned on this idea as being outside the bounds of reason, but on more than one occasion have been proved wrong by subsequent events. The growing tendency of the American public to buy what it wants instead of what conservatives think it ought to have is strikingly emphasized by the report of 1927 business in dry goods stores put out recently by the Controllers' Congress of the National Retail Dry Goods Association, which shows that in every single Federal Reserve district departments selling luxuries recorded an increase in business over 1926, while many departments selling so-called staples showed a considerable decline.

* * *

Jewelry and Hosiery Make Biggest Gains

IN eleven districts out of thirteen, *The Dry Goods Economist* points out in analyzing the report, "The jewelry department is reported as one of the big winners of the year. It is closely r i v a l e d by hosiery, which is named in ten of the thirteen, while toilet goods, underwear, and basement ready-to-wear are listed by the stores of seven districts and small leather goods and negligees by those in six districts." The fact is then pointed out that while hosiery is an essential part of a woman's clothing, it would be merely quibbling to argue that women today are not buying hosiery on a luxury basis, "for every merchant knows that women buy hosiery today for color and beauty and not for utility; if the latter were true they would still be wearing cotton and wool." Even the increase in basement ready-to-wear sales, according to this publication, indicates that the limited income buyer is buying on a luxury basis, purchasing two or three cheap articles on a style basis rather than a single article of higher price for mere utility.

* * *

Beauty and Novelty Are Governing Factors

THE rather startling facts brought out by this analysis leads again to the need for constant accumulation of facts as a basis for stocking and selling procedure and the danger of reliance on merely general ideas of what probably ought or ought not to be. While the automobile itself has long since passed out of the luxury class, the recent strong emphasis on style and color appeal tends to emphasize its luxury qualities, while the purchase of certain types of accessories falls pretty clearly in the luxury category. The recognized importance of the woman in the buying of automobiles and accessories today makes pertinent the last paragraph of the editorial in the *Dry Goods Economist* commenting on this report, even though its application is much more limited in the automotive than in the department store field. That paragraph says: "The one central fact which the merchant of today must bear in mind is that the American woman buys today on a luxury and not on a utility basis. It is beauty and novelty which govern her choice."

* * *

More is Spent for Advertising

NEARLY twenty automobile companies ranked among the 150 largest advertisers in 92 national magazines of general character last year, according to figures published by *National Advertising Records.* An equal number was among the leaders in 1926. In view of the fact that the output of a good many passenger car companies was smaller last year than in 1926, it is interesting to note that total appropriations in this group of magazines was increased in most instances nevertheless. The result naturally, was a general increase for those companies in the cost per car of general media advertising last year. Even some of the companies which increased their output considerably in 1927 had a step-up in the per car cost of this general media advertising just the same. Others, however, including Chrysler, Chevrolet, Willys-Overland, showed a decreased cost per car. Among those who had greater expenditure per car in general media in 1927 than in 1926 were Hudson - Essex, Cadillac - LaSalle, Hupmobile, Oakland - Pontiac and Studebaker.

* * *

MOTOR WORLD WHOLESALE was the only automotive publication among those receiving honorable mention in the awards made by the Associated Business Papers to the publications believed to have rendered the most definite and outstanding service to their fields in 1927. Our hearty congratulations!—N.G.S.

James M. Crawford

Why I Don't Believe in *Stock-Car* Racing

Value of technical data thus obtained is not commensurate with the cost.

By James M. Crawford*
Assistant Chief Engineer, Chevrolet Motor Car Co.

I DO not believe that racing is the cheapest form of determining the engineering characteristics of a car. Rather I think it is the most expensive. That was borne out in one case where the engineering department protested against some contest work.

The engineers already had the facts in hand to know that the job could not possibly stand up under the conditions to which it was going to be subjected. About $4,000 was spent and three or four engines wrecked in an attempt to put the job into condition. The total cost of the same finding at the factory was about $225.

The only way to answer the argument about what shall and what shall not be a stock car, I think, is to take a car off the salesroom floor and have no work whatever done upon it.

From a strictly engineering standpoint, I think the greatest harm that is done by stock-car contests is the fact that they draw the engineer's attention away from the things he should be attending to at the factory. I know this has been the case in my own experience. Moreover, stock car racing has a tendency to put into cars characteristics from which the public never gets any benefit. It encourages high gear ratios, which the general public cannot handle. It encourages special types of bodies which can be built only in limited quantities at no profit to the manufacturer. It also encourages the manufacturer to build a special car for racing strictly for the purpose of listing it as a stock job.

If the engineer is to obtain necessary and accurate technical data he has to be on the job and that, I think, is the biggest drawback. These races are held all over the country and it is no part of the function of the chief engineer of an institution to travel around, spending weeks and almost months at a time in order to put his racing job over.

While cars developed may not in themselves show undesirable characteristics in the hands of the public on a particular job, still as a general average they do. The idle is usually off and if the high gear ratio is used the acceleration is bad, the good riding qualities are often sacrificed for high speed on the road and especially when cross country runs are attempted. High speed is a very unfair basis, anyhow, upon which to judge a car's value.

We must all come back to the fact that there are very few racing drivers and high-speed drivers buying automobiles. That can be proved every day on the road. It is very hard to pick a race with anybody now. It is usually mamma who buys the automobile and she doesn't care about speed.

I do not believe there is any advertising value in stock-car racing simply because there always is going to be progress and no matter how good a record is today somebody will come out tomorrow and beat it and the public will soon forget all about the first job. That has been demonstrated in the

THE stock-car racing argument rages on.

Both sides were ably championed at the recent S.A.E. meeting in Detroit.

The case in favor of such racing was most fully outlined by F. E. Moskovics, president, Stutz Motor Car Co. of America. Mr. Moskovics' contentions were presented rather fully on pages 152 and 153 of our issue of Feb. 4.

Probably the most completely adverse criticism of stock car racing came from James M. Crawford, formerly chief engineer of Auburn and now assistant chief engineer of Chevrolet. His most important comments are included in this article.

* From discussion presented at S.A.E. annual meeting, Detroit, Jan. 25, 1928.

Just Among Ourselves

Buying Luxuries Instead of Staples

OPTIMISTIC members of the industry have long contended that people will continue to buy automobiles and accessories even when they are somewhat hard pressed for money; that other expense items, once regarded as the only necessities, will always be cut down before the purchase of a new car or of much-wanted accessories is withheld. Beetle-browed logicians have frowned on this idea as being outside the bounds of reason, but on more than one occasion have been proved wrong by subsequent events. The growing tendency of the American public to buy what it wants instead of what conservatives think it ought to have is strikingly emphasized by the report of 1927 business in dry goods stores put out recently by the Controllers' Congress of the National Retail Dry Goods Association, which shows that in every single Federal Reserve district departments selling luxuries recorded an increase in business over 1926, while many departments selling so-called staples showed a considerable decline.

* * *

Jewelry and Hosiery Make Biggest Gains

IN eleven districts out of thirteen, *The Dry Goods Economist* points out in analyzing the report, "The jewelry department is reported as one of the big winners of the year. It is closely r i v a l e d by hosiery, which is named in ten of the thirteen, while toilet goods, underwear, and basement ready-to-wear are listed by the stores of seven districts and small leather goods and negligees by those in six districts." The fact is then pointed out that while hosiery is an essential part of a woman's clothing, it would be merely quibbling to argue that women today are not buying hosiery on a luxury basis, "for every merchant knows that women buy hosiery today for color and beauty and not for utility; if the latter were true they would still be wearing cotton and wool." Even the increase in basement ready-to-wear sales, according to this publication, indicates that the limited income buyer is buying on a luxury basis, purchasing two or three cheap articles on a style basis rather than a single article of higher price for mere utility.

* * *

Beauty and Novelty Are Governing Factors

THE rather startling facts brought out by this analysis leads again to the need for constant accumulation of facts as a basis for stocking and selling procedure and the danger of reliance on merely general ideas of what probably ought or ought not to be. While the automobile itself has long since passed out of the luxury class, the recent strong emphasis on style and color appeal tends to emphasize its luxury qualities, while the purchase of certain types of accessories falls pretty clearly in the luxury category. The recognized importance of the woman in the buying of automobiles and accessories today makes pertinent the last paragraph of the editorial in the *Dry Goods Economist* commenting on this report, even though its application is much more limited in the automotive than in the department store field. That paragraph says: "The one central fact which the merchant of today must bear in mind is that the American woman buys today on a luxury and not on a utility basis. It is beauty and novelty which govern her choice."

* * *

More is Spent for Advertising

NEARLY twenty automobile companies ranked among the 150 largest advertisers in 92 national magazines of general character last year, according to figures published by *National Advertising Records.* An equal number was among the leaders in 1926. In view of the fact that the output of a good many passenger car companies was smaller last year than in 1926, it is interesting to note that total appropriations in this group of magazines was increased in most instances nevertheless. The result naturally, was a general increase for those companies in the cost per car of general media advertising last year. Even some of the companies which increased their output considerably in 1927 had a step-up in the per car cost of this general media advertising just the same. Others, however, including Chrysler, Chevrolet, Willys-Overland, showed a decreased cost per car. Among those who had greater expenditure per car in general media in 1927 than in 1926 were Hudson - Essex, Cadillac - LaSalle, Hupmobile, Oakland - Pontiac and Studebaker.

* * *

MOTOR WORLD WHOLESALE was the only automotive publication among those receiving honorable mention in the awards made by the Associated Business Papers to the publications believed to have rendered the most definite and outstanding service to their fields in 1927. Our hearty congratulations!—N.G.S.

James M. Crawford

Why I Don't Believe in *Stock-Car* Racing

Value of technical data thus obtained is not commensurate with the cost.

By James M. Crawford*
Assistant Chief Engineer, Chevrolet Motor Car Co.

I DO not believe that racing is the cheapest form of determining the engineering characteristics of a car. Rather I think it is the most expensive. That was borne out in one case where the engineering department protested against some contest work.

The engineers already had the facts in hand to know that the job could not possibly stand up under the conditions to which it was going to be subjected. About $4,000 was spent and three or four engines wrecked in an attempt to put the job into condition. The total cost of the same finding at the factory was about $225.

The only way to answer the argument about what shall and what shall not be a stock car, I think, is to take a car off the salesroom floor and have no work whatever done upon it.

From a strictly engineering standpoint, I think the greatest harm that is done by stock-car contests is the fact that they draw the engineer's attention away from the things he should be attending to at the factory. I know this has been the case in my own experience. Moreover, stock car racing has a tendency to put into cars characteristics from which the public never gets any benefit. It encourages high gear ratios, which the general public cannot handle. It encourages special types of bodies which can be built only in limited quantities at no profit to the manufacturer. It also encourages the manufacturer to build a special car for racing strictly for the purpose of listing it as a stock job.

If the engineer is to obtain necessary and accurate technical data he has to be on the job and that, I think, is the biggest drawback. These races are held all over the country and it is no part of the function of the chief engineer of an institution to travel around, spending weeks and almost months at a time in order to put his racing job over.

While cars developed may not in themselves show undesirable characteristics in the hands of the public on a particular job, still as a general average they do. The idle is usually off and if the high gear ratio is used the acceleration is bad, the good riding qualities are often sacrificed for high speed on the road and especially when cross country runs are attempted. High speed is a very unfair basis, anyhow, upon which to judge a car's value.

We must all come back to the fact that there are very few racing drivers and high-speed drivers buying automobiles. That can be proved every day on the road. It is very hard to pick a race with anybody now. It is usually mamma who buys the automobile and she doesn't care about speed.

I do not believe there is any advertising value in stock-car racing simply because there always is going to be progress and no matter how good a record is today somebody will come out tomorrow and beat it and the public will soon forget all about the first job. That has been demonstrated in the

THE stock-car racing argument rages on.

Both sides were ably championed at the recent S.A.E. meeting in Detroit.

The case in favor of such racing was most fully outlined by F. E. Moskovics, president, Stutz Motor Car Co. of America. Mr. Moskovics' contentions were presented rather fully on pages 152 and 153 of our issue of Feb. 4.

Probably the most completely adverse criticism of stock car racing came from James M. Crawford, formerly chief engineer of Auburn and now assistant chief engineer of Chevrolet. His most important comments are included in this article.

* From discussion presented at S.A.E. annual meeting, Detroit, Jan. 25, 1928.

last year, I think, in at least several well-known cases.

That is why some of the executives are very happy to get out of this situation. I don't think that they really wanted to get into it, but the advertising managers made these claims and somehow or other they had to be backed up. It was up to the engineer to try to do it. In some cases he succeeded . . . . . .

Fundamentally, from an engineering standpoint, I don't see why we should pay the salary of race promoters and the overhead of tracks around the country to develop our products. It can be developed much more cheaply at our own testing grounds.

A local increase in sales, is, I believe, the only direct benefit of stock-car racing. In other words, sales generally jump up in the locality in which the race is held. But even in these instances the most sales do not always go to the winner of the race.

It seems to me that the person who gets the most out of this racing game is the one that makes all the preparations to go in, designs his job so and puts everything into it that he thinks ought to be in it—and then stays out.

Wholesale Conference

(Continued from page 324)

changing conditions there was still the opportunity for the wholesalers to turn the tide back in their direction. He spoke of direct selling as a delusion in that it did not eliminate the cost of the services which the wholesaler performs; he said that chain stores were up against serious problems and that buying by retail groups might not introduce a real saving.

Hence the need for the development of better and more economical methods by wholesalers.

The program of study laid down by the conference as a result of these and other recommendations was most comprehensive, covering such subjects as group buying; costs of distribution with a view to determining economic trade areas, profitable lines, profitable customers and profitable sizes of orders; uniform accounting to facilitate cost comparisons; credit extension, price terms and other practices; private brands; group buying; department and chain stores and their effect upon buying, and warehousing.

Against the background of the deliberations of the conference, with the dominant note of the desirability of more and better fact-finding, the recent distribution census made by the Bureau of the Census and prepared by the domestic distribution department attains added significance.

Just one of the significant facts revealed is that in the six cities covered by the census—Syracuse, Kansas City, Seattle, Atlanta, Providence and Denver—there are 285 accessory and supply wholesalers. While it is not to be inferred that any manufacturer needs that number of outlets, the figures do indicate how pyramiding of car registrations and intensive competition have made specialization and multiplication possible in the automotive wholesale field.

The accompanying table summarizes a few of the points brought out in the reports concerning automotive supply wholesalers.

One of the interesting features of the compilation is the wide variance in some respects of the data covering different cities. Thus, of total wholesale business in all lines, automotive supply wholesalers handle from 2.61 per cent to 5 per cent. Average sales per establishment also vary considerably from city to city.

The retail figures bring out some significant facts. In most of the cities automotive supply stores are selling by far the greater proportion of accessories and other supplies, although in one or two a very good showing is made by the automobile dealers.

Wholesale Automotive Supply Outlets in Six Cities

Name of city / Population	SYRACUSE 185,000		KANSAS CITY 375,300		SEATTLE 367,300	
	All Wholesalers	Automotive Supplies	All Wholesalers	Automotive Supplies	All Wholesalers	Automotive Supplies
Total establishments	351	15	1,327	93	1,168	59
Total sales	$128,981,200	$5,171,100	$1,061,616,400	$39,169,600	$466,837,200	$15,593,000
Percentage of total sales	...	4.22%	...	3.85%	...	3.61%
Average sales per establishment	$367,468	$344,740	$800,012	$421,178	$399,689	$264,288
Average sales per employee	$78,360	$41,369	$130,228	$72,806	$112,356	$53,955
Total number of employees	1,646	125	8,152	538	4,155	289
Average No. employees per establishment	4.70	8.33	6.14	5.78	3.56	4.90
Average yearly pay roll	$8,099,800	$461,700	$42,657,500	$3,167,800	$23,808,400	$2,198,700
Aver. yearly salary per employee	01,729	$2,138	$1,897	$1,915	$1,959	$2,106
Percentage of selling employees	35%	58%	36%	33%	34%	28%
Percentage non-selling employee	65%	42%	64%	67%	66%	72%
Ratio pay roll to sales	6.28%	8.93%	4.02%	8.09%	5.10%	14.10%
Total average inventory	$12,021,600	$767,500	$64,513,300	$4,746,400	$39,860,000	$3,000,200
Average inventory per establishment	$34,250	$51,167	$48,616	$51,037	$34,127	$50,851

Name of city / Population	ATLANTA 244,100		PROVIDENCE 443,600		DENVER 285,000	
	All Wholesalers	Automotive Supplies	All Wholesalers	Automotive Supplies	All Wholesalers	Automotive Supplies
Total establishments	880	57	523	21	719	40
Total sales	$534,645,200	$25,748,800	$200,182,300	$5,224,300	$319,869,200	$12,532,500
Percentage of total sales	...	5.00%	...	2.61%	...	3.92%
Average sales per establishment	$607,155	$451,733	$382,758	$248,776	$444,881	$313,313
Average sales per employee	$123,818	$92,662	$90,010	$73,582	$94,135	$76,418
Total number of employees	4,318	278	6,330	150	10,502	422
Average No. employees per establishment	4.91	4.88	12.10	7.14	14.61	10.55
Average yearly pay roll	$21,973,400	$1,528,700	$11,140,800	$356,600	$17,817,400	$758,700
Aver. yearly salary per employee	$1,844	$2,074	$1,733	$2,377	$1,697	$1,862
Percentage of selling employees	36%	38%	35%	47%	32%	39%
Percentage non-selling employee	64%	62%	65%	53%	68%	61%
Ratio pay roll to sales	4.11%	5.94%	5.57%	6.83%	5.57%	6.26%
Total average inventory	$28,747,800	$2,859,100	$14,088,000	$597,300	$23,317,600	$1,641,200
Average inventory per establishment	$32,668	$50,160	$26,937	$28,443	$32,431	$41,030

Gas-*Electric* Drives Discussed by Pennsylvania S. A. E.

Gasoline engine and series-wound electric motor compared with respect to influence of speed on available torque. Two methods of braking provided.

By P. M. Heldt

IN discussing the characteristics of the gas-electric drive before the S.A.E. Pennsylvania Section last week, E. A. Atwell, designing engineer of the Westinghouse Electric & Manufacturing Co., referred to the differences between an automotive-type gasoline engine and a series-wound electric motor with respect to the influence of speed on the available torque. Whereas the "full-throttle" torque of the engine is nearly constant throughout the range of speed, the torque of a series motor varies within wide limits, increasing as the speed decreases. This and other characteristics of generators and motors specially designed for gas-electric drives were illustrated by graphs projected on the screen.

Electric machines designed for this service must possess special qualities in order to meet the requirements. To permit good commutation under all conditions, commutator poles are used in both the generators and motors. The generator excitation is by a main shunt winding, a small series winding, a commutating winding and a small separate-excitation winding connected across the terminals of a battery. The latter winding is used in order that the generator may pick up quickly when the throttle is suddenly opened, thus holding down the engine and preventing it from racing. The object of the commutating field winding is to permit of weakening the field to enable the engine to run at a higher speed and give greater horsepower. This commutating winding is cut out by means of a foot switch convenient to the driver, whenever this extra power is needed.

Two methods of electric braking are provided. One is a direct dynamic brake, the motor being disconnected from the generator, its field reversed and its terminals connected together through a resistance. The braking power then varies with the speed of the vehicle. This brake is very good on down-grades, as it keeps the vehicle running at very nearly uniform speed, without heating and without strain. The other brake also is an electric one and the braking effect is obtained by connecting the motor to the generator in reverse.

Efficiency is Explained

Mr. Atwell said one of the questions most frequently asked concerning the gas-electric drive is what is its efficiency, or, in other words, what is the proportion of the engine power which is lost in the double conversion. He answered this by displaying a curve which showed the combined efficiencies of the generator and motor. Under the most favorable conditions this amounts to 74 per cent, and it tapers off to about 50 per cent under less favorable conditions.

G. W. Wilson, engineer, General Electric Co., in dealing with gas-electric drive taxicabs, referred to the keen competition with the private motor vehicle that is felt by all who are engaged in public transportation service. The riding public, he said, wants transportation service comparable to that furnished by private cars. He also referred to the severity of the conditions under which taxicabs must operate. Private automobiles are generally driven always by the same person, and the driver will notice almost instantly any irregularities, and have them attended to. Moreover, a private car is driven only 6000 to 8000 miles a year on the average. Taxicabs, on the other hand, are driven as much as 35,000 miles a year, and the drivers have not the same interest in their vehicles as private owners. This makes an electric automatic transmission desirable in taxicab service, as there is less opportunity for abusing the vehicle.

Gas-Electric Cab

The General Electric Co. furnished the electrical equipment for the taxicab with electric drive which was recently placed in service by the Philadelphia Rural Transit Company. The chassis for this cab is that of a Willys-Knight Model 78 car, which weighs 2300 lb. The original transmission was removed and a generator was connected to the engine through a Spicer rubber-ball type universal joint. This delivers current to a motor driving the rear wheels through a gear reduction of 9.85:1. With taxicab body and the electric drive the cab weighs 3900 lb. and with full load 4600 lb.

In the discussion Mr. Atwell pointed out that while the gasoline mileage was somewhat reduced with electric drive and the weight of the complete vehicle increased, this was not the whole story. Owing to its greater average acceleration, a bus with electric drive can cover 10 to 15 miles and even 20 per cent more mileage per day than a bus with mechanical transmission.

A. K. Brumbaugh of the White Motor Co. said his firm had investigated the electric drive and had come to the conclusion that it was as yet in an early state of its development.

Mr. Brumbaugh stated that his company had produced a gas-electric which was its conception of what such a bus should be.

H. C. Abell of the International Motor Co. when called upon to discuss the papers said that his firm had been interested in gas-electric drives for some time and recently had produced a bus of the street-car type in which the generating unit was located at the rear so it could be easily withdrawn.

There was also considerable discussion regarding the horsepowers required with gas-electric drive and the actual horsepowers available with present-day engines.

Many New Truck Models Offered for 1928 Selling Season

Six-cylinder job is added to Coleman line. Atterbury, Relay, Diamond T and Stewart also announce new sixes.

A NEW 1½ to 2-ton model powered with a six-cylinder engine and designated as Model C-25 has been added to the four-wheel drive line of Coleman Motors Corp., Littleton, Colorado.

Standard unit sub-assemblies are used wherever possible throughout the design. The engine is a 3⅜ by 4½ Buda, Model HS-6, developing 51 hp. at 1800 r.p.m. and providing 30 m.p.h. when equipped with 32 by 6 pneumatic tires. Electrical system is Delco-Remy with Exide battery. The carburetor is a Stromberg type OE-2 which is fed by vacuum from two separate gasoline tanks mounted on each side of the chassis and having a capacity of 21½ gal. each. A belt-driven centrifugal pump, 16-in. fan and Rome-Turney tubular core radiator make up the cooling system.

A multiple disk clutch and four-speed transmission, Fuller type GU-12, are mounted in unit with the engine. Eight gear ratios ranging from 7.25 to 1 in high to 139.2 to 1 in low are made available by reason of a Coleman auxiliary transmission mounted amidships. Herringbone gears are used in this unit and a neutral position is provided for power take-off.

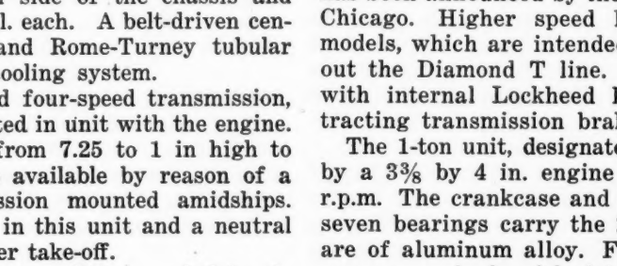
Driveshafts and universals are Spicer and drive is Hotchkiss both front and rear through semi-elliptic springs, 3 in. wide and 48 in. long.

The axles are worm drive and full floating. Differentials, worms and shafts are interchangeable front and rear. Timken roller bearings are used. Steering is by Ross cam and lever gear.

The frame is of 5 in. channel over the springs, increasing to 10 in. depth between spring hangers and braced at rear for a trailer hitching device. Both the emergency and service brakes provide braking effort to all four wheels. The emergency brake acts on a 10 by 5 in. drum mounted on the main driveshaft and the service brake acts on 15 by 3½ in. rear wheel drums.

Wheelbase is 109 in., tread 56 in., turning radius 32 ft., chassis weight with cab 5360 lb., body space behind cab 9 ft., overall length 16 ft. 10 in., and frame height without load 34 in.

Standard equipment includes cab, electric lights, horn, tire carrier, power air pump mounted on transmission, starter, generator and battery. The cab is of the all-weather type constructed of steel and three-point suspended on its own sub-frame. The seat is spring mounted and back air cushioned.



New six-cylinder, 3-ton Autocar truck, designed for road-building service. It was described briefly in the issue of Feb. 11

Diamond T Sixes

PRODUCTION on two new six-cylinder models of 1 and 2 tons' capacity priced at $1,095 and $1,650 has been announced by the Diamond T Motor Car Co., Chicago. Higher speed has been built into these models, which are intended to more completely round out the Diamond T line. Both models are equipped with internal Lockheed hydraulic brakes and contracting transmission brakes.

The 1-ton unit, designated as Model 150, is powered by a 3⅜ by 4 in. engine developing 61 hp. at 3000 r.p.m. The crankcase and block are cast integral and seven bearings carry the 2⅛ in. crankshaft. Pistons are of aluminum alloy. Full pressure lubrication by gear pump is furnished to main and connecting rod bearings. Ignition, distributor type, is Auto-Lite. Carburetion is by Zenith, gravity fed from an 11 gal. tank under the seat.

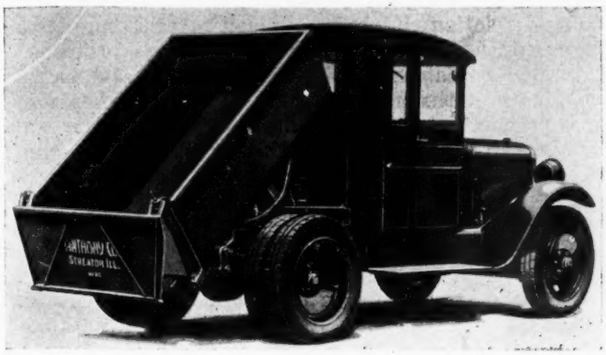
The cooling system consists of a centrifugal pump, 18 in. fan and cellular type radiator with nickel polished shell. The clutch, which is multiple disk type, and transmission are mounted in unit with the engine. The gearset provides three speeds with a ratio of 3.62 to 1 in low. An all-metal universal-equipped tubular driveshaft connects with a spiral bevel drive, semi-floating rear axle having a final reduction of 5⅛ to 1. Drive is taken through the springs. Cam and lever type steering is used.

Four semi-elliptic springs carry the frame, which is of pressed steel, 5 in. section, 3 in. flange and 3/16 in. thickness. Channel cross-members are used for reinforcing. Front springs consist of seven leaves 2¼ by 40 in.; the rear nine leaves, 2½ by 50 in. Spring eyes are bronze-bushed. Wheels are

metal spoke equipped with 30 by 5 pneumatic tires.

This job is furnished in one standard wheelbase, 127½ in., providing a distance of 51½ in. from back of seat to center of rear axle. Tread is 56½ in. front and 58 in. rear.

The powerplant of Model 302, the 2-ton unit, is essentially of the same construction as in Model 150. This engine with its 3¾ in. bore and 4½ in. stroke



This is the 2-ton road-builder recently announced by Graham Brothers and described in our issue of Jan. 21

develops 65 hp. at 2400 r.p.m. The crankshaft, also carried in seven bearings, is larger, 2⅝ in. A built-in filtrator also characterizes this model. Lubrication, ignition and carburetion are the same. The gasoline tank has a capacity of 30 gal.

While circulation is the same, the radiator used in this model carries a copper fin and flat tube core. The outside case of the shell is built up of four readily detachable castings, spring mounted on the frame.

A four-speed transmission is mounted in unit with a multiple-disk clutch and the engine. Two all-metal universals and a self-aligning bearing connect the two-piece propeller shaft to the rear axle, which is of the same type used in Model 150 but providing a final reduction of 6.37 to 1. The axle housing in the heavier model is cast steel against pressed steel in the lighter unit. Drive is the same.

This model is furnished in two standard wheelbases, 155¾ and 165½ in. and a special of 174 in. at extra cost. Distance back of seat to center of rear axle on the standard wheelbases are 73½ and 83¼ in.

1½ Ton Stewart Truck

THE Stewart Motor Corp., Buffalo, N. Y., has brought out a new 1½-ton truck model, furnished with either a four or six-cylinder engine, four-wheel Bendix brakes and full equipment. Chassis price is $1,645 with either engine.

The six-cylinder engine is 3¼ by 4½ in., develops 52 hp., has a four-bearing crankshaft, full pressure lubrication, removable block and cylinder head, rifle drilled connecting rods and is equipped with a water pump and also a thermostat heat control.

The six-cylinder engine is 3¼ by 4½ in., develops 52 hp., has a four-bearing crankshaft, full pressure lubrication, removable block and cylinder head, rifle drilled connecting rods and is equipped with a water pump and thermostat.

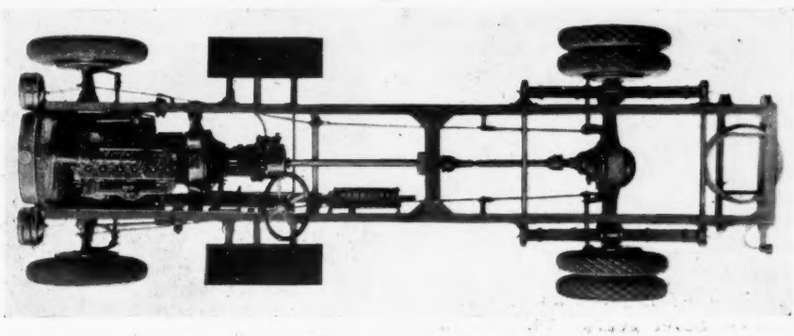
The four-cylinder engine is 4 by 5 in., develops 44 hp. and is otherwise similar to the six-cylinder job.

The Zenith carburetor is equipped with an air cleaner and gas filter. Delco-Remy ignition, generator and starter are standard. The radiator is cellular core type of pressed steel shell. The dry-plate clutch has nine plates of the gear tooth type.

The unit-mounted transmission is regularly furnished in three speeds with a four-speed unit available at extra cost. Ross steering gear is employed. Frame rails are 7½ in. deep. The I-beam front axle is equipped with Timken roller bearings. Front springs are 38½ by 2¼ in. with 10 leaves; rear springs have 12 leaves and are 50 by 3 in. Spring eyes are bronze bushed.

The rear axle is of semi-floating spiral bevel gear type with a four-pinion type differential and chrome nickel steel shafts, 2½ in. diameter. Standard gear ratio is 6.37.

Bendix mechanical four-wheel brakes, 16 by 2 in. on front wheels and 16 by 2½ on rear wheels, are augmented by a transmission brake 8½ by 4 in. Tubular driveshaft is 2 in. in diameter and is fitted with three joints. Wheelbase is 145 in. Special wheelbases of 160 and 135 in. are available.



New Stewart 1½-ton truck

Fast Atterbury Model

A NEW 2 to 2½-ton chassis, designed for long-distance hauling, has been added to the Atterbury line of sixes. This new unit, supplied in three wheelbases, 168, 186 and 154 in., is powered by a 3⅝ by 5 in. six-cylinder engine capable of providing a road speed of 45 m.p.h. The engine, suspended from three points, is of the bus type with full pressure feed lubrication, thermostatic temperature control, oil filter, air cleaner, starter and magneto ignition.

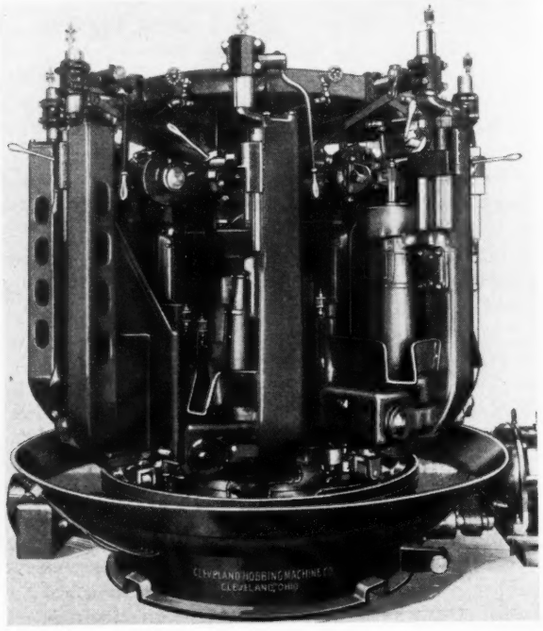
The transmission, mounted in unit with the clutch and engine, provides four speeds. Drive is through a three-joint propeller shaft supported in the center with a self-aligning ball bearing. A Timken worm-drive axle carries an over-size, air-cooled emergency brake on the worm shaft. Service braking is provided by full surface, double-shoes, acting internally on carbon steel drums mounted on the rear wheels. 32 by 6 in. pneumatic tires with duals at rear are standard.

THE Relay Motors Corp., Lima, Ohio, has announced a six-cylinder, pneumatic tired Relay Drive model rated at 1½ tons. Features of this new job include high compression six-cylinder engine with detachable head; four-wheel hydraulic brakes; four-speed transmission; battery ignition; streamlined radiator with polished upper tank and cast lower tank; generator, starter and lights.

NEW DEVELOPMENTS—Automotive

Multiple-Spindle Hobbing Machine

INTRODUCTION of a multiple-spindle hobbing machine is announced by the Cleveland Hobbing Machine Co., Cleveland. In this machine there are eight spindles, each functioning as a separate machine. It is adapted mainly to mass production, for while the machine is variable according to the type of work to be turned out, this process is necessarily complicated. Its prime object is to reduce the amount of labor and floor space necessary for mass production as compared with the use of a number of single spindle machines.



New Cleveland eight-spindle hobbing machine

In layout, the spindles are arranged in a circle, the entire assembly rotating, with the work-heads revolving slowly on a common axis so that the operator does not have to move from his position to load and unload the machine. It is compact in design due to this type of construction, and is adaptable to practically every type of unit in the automobile requiring this type of work, from axle shafts to small gears. With splined shafts, different lengths of shafts can be run through at the same time by adjusting the individual work-heads to accommodate the variation in length.

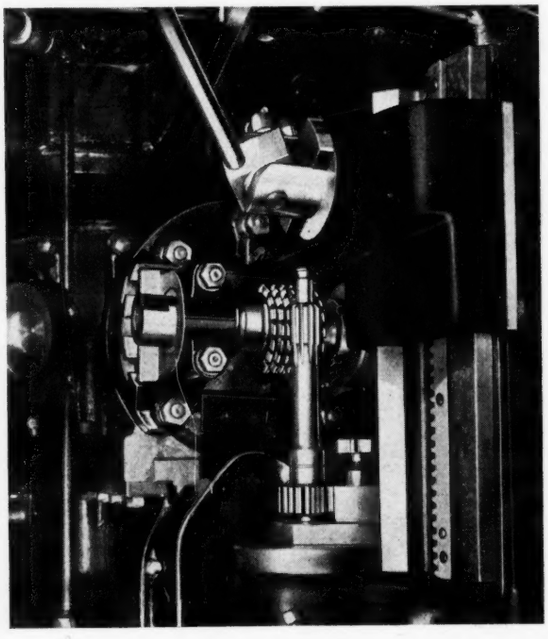
Drive is by means of a 5-hp. electric motor through a horizontal main shaft to a gearbox at the bottom of the machine, gearbox and motor being mounted on opposite sides for compactness. Through the gears a short horizontal shaft drives through a worm reduction the vertical shaft in the center of the machine which in turn rotates the turret through a set of spur and internal gears. Power for driving both the hob and work spindle is taken at the center of the machine from the main driveshaft through bevel gears. This drive is transferred through a vertical shaft to a large bevel gear at the top of the turret.

Meshing with this gear are eight bevel pinions mounted on horizontal shafts radiating to each hob head. A friction clutch is provided in each hob drive and working spindles between the pinion and shaft of each unit. From each horizontal shaft the drive to the hob spindles is through spur gears to a shaft located in the same horizontal plane as the hob spindle. The hob carriage can be swiveled to whatever angular position is required. A longitudinal adjustment is also provided. For accurate adjustments a micrometer dial equipped screw is provided.

Drive to the work-heads is also taken from the main horizontal shaft, through bevel gears and a vertical shaft to the mechanism in the work spindle housing. Change gears are also provided in order to maintain the proper ratio between the rotation of the hob and work spindles.

Work is fed to the hob head by means of a simple positive cam at the base of the machine, on which rollers from each spindle ride. In construction chrome nickel steel heat treated gears are used, while annular ball bearings are used on all shafts except the work spindles, where Timken taper roller bearings are provided. Ball thrust bearings are used on hob spindles, as well as a large ball thrust bearing taking part of the load of the turret on the spindle housing. As mentioned, roller bearings carry the work-heads on the circular cam, the latter being stationary, and designed to complete the full feed in one revolution of the entire assembly.

The turret is of cast iron with a cored center. It is heavily ribbed to insure rigidity to the work-heads. A flat bearing on the base and a ball thrust bearing on the spindle housing assure easy rotation of the turret. The latter is octagonal in shape, in view of the fact that eight hobbing units comprise the assembly. Lubri-



Detail view of hobbing operation on clutch shaft

Parts, Accessories and Production Tools

cation is by means of grease cups to unencased gears, while encased gears run in oil. The base of the machine acts as a reservoir from which coolant is pumped by individual pumps on each work-head to the hobs.

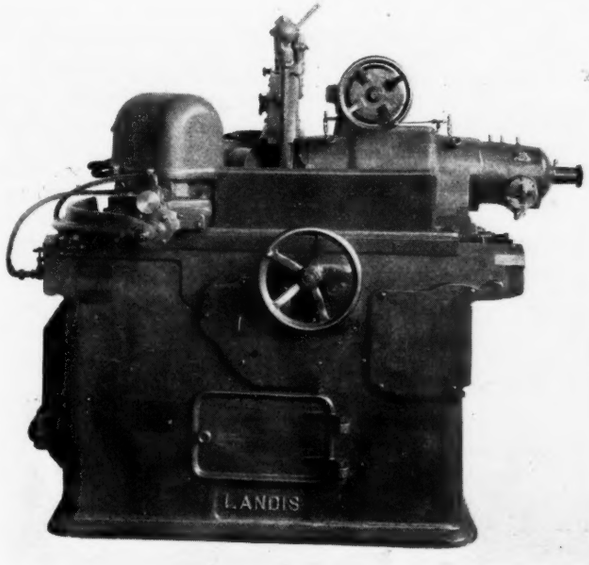
In operation the work is held vertically between centers with the end to be splined or hobbed toward the top of the machine. The hob itself is positioned horizontally. As the machine rotates slowly, the cam around the base raises the work. Each work-head is thus raised and lowered as the turret revolves. A gap in the cam immediately in front of the operator's position provides a means for loading and unloading the work. Work is held by means of a chuck on the lower spindle arm. Reloading is facilitated by provision of a lever by means of which the lower or work holding center can be raised or lowered, this lever also serving as a binder to hold the work in position.

A push button operates the motor. In addition to the reloading arm, a knockout arm is provided for removing the work, while a third lever engages or disengages the friction clutch drive to each work-head, without affecting the operation of the other heads.

Valve-Face Grinder

THE semi-automatic, hydraulic, valve-face grinder recently developed by Landis Tool Co., Waynesboro, Pa., is designed for mass grinding of valves and similar small parts. The bed, wheelbase, rear drive, oil pump and such units of the new machine are similar to those on the Landis 6 in. plain hydraulic grinder, but the work carriage, work head and cross slide have been especially designed for this particular operation.

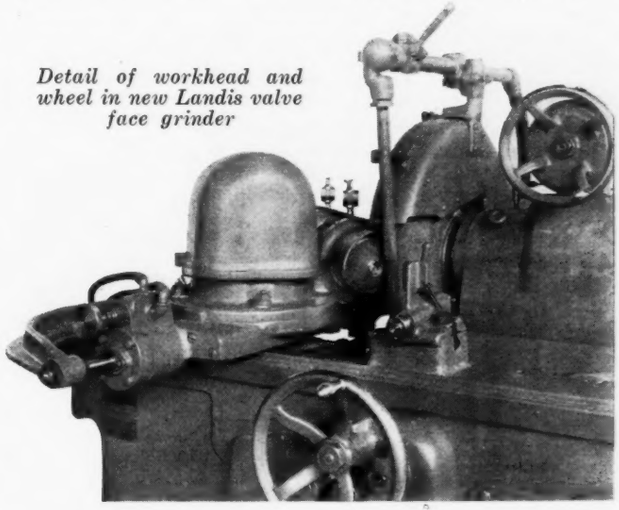
The live spindle workhead is mounted at an angle of 45 deg. on a cross slide which moves at right angles to the axis of the grinding wheel spindle. Hydraulic power moves the cross slide. A ½-hp. constant speed motor mounted on the head drives the work spindle through a silent chain. Movement of the head automatically regulates the rotation of the spindle, a limit switch on the underside of the slide making electrical contacts.



Landis hydraulic valve face grinder

The air-operated work-holding fixture consists of a clamping block on which the valve stem is placed, a clamping arm which carries the clamping shoe and a locator which positions the valve so that its face will be properly presented to the grinding wheel. As in the case of the work spindle rotation, movement of the work head automatically regulates the clamping and releasing of the clamping shoe.

The grinding wheel is equipped with an alloy steel spindle which runs in bronze cap bearings lubricated under pressure. A 24 by 1 by 8 in. wheel is used. The wheel spindle is of the reciprocating type to eliminate wheel marks on the work. Equipment includes a standard 6-in. plain hydraulic wheel truing fixture. Workhead feed power is furnished by a geared oil pump driven from the rear driveshaft. The work carriage is traversed by hand, a back gear arrangement giving a slow speed for truing the grinding wheel.



Detail of workhead and wheel in new Landis valve face grinder

Either lineshaft or direct drive may be employed in addition to the electrical work drive motor required. A 5-hp., 1150 r.p.m. motor is suggested as being of sufficient size.

Gasoline Crane

FOR use in unloading cars and for construction work, etc., in automotive plants, the American Hoist & Derrick Co., St. Paul, Minn., has developed a gasoline engine-powered locomotive crane equipped with an automotive three-speed transmission to provide maximum flexibility.

The machinery deck revolves on 20 bronze bushed conical rollers and it is locked to the car body at the outer circumference of a bull gear by an interlocking gib ring. This method distributes the stress instead of concentrating it all on the king pin. Capacities range from 12 to 30 tons.

AUTOMOTIVE NEWS SECTION INDUSTRIES
Philadelphia, Pennsylvania February 25, 1928

Factories Increase Schedules as February Sales Improve

PHILADELPHIA, Feb. 25—Increasing schedules in practically every plant in the industry will bring a gain in February automobile production which will compare favorably with any previous increase. While the gain will be most marked among those factories represented in the National Automobile Chamber of Commerce, the Ford company will show a fair increase over January and will increase the number of its assembly plants in operation.

Retail buying is showing continuous improvement with the approach of spring, this improvement being noted in used cars as well as new; the improvement in used car buying having important bearing in boosting new car sales. The middle western industrial district has developed large purchasing volume within recent weeks, though improvement is evident in practically all territories under the influences of the early year shows.

Though the largest part of the increased production is in the small car field, important gains in production are being registered by many companies building cars in the medium and high-priced lines. Several companies which introduced cars in the medium priced field for the first time this year report output sold several months in advance, while practically every medium priced car plant is showing definite gains over its 1927 marks.

Eastern Cities Place Large Orders With Olds

LANSING, Feb. 18—It is estimated that Oldsmobile dealers will ask the factory for approximately 15,000 cars in March, D. S. Eddins, general sales manager of Olds Motor Works, declared in an address before the Oldsmaker's Club. Mr. Eddins said retail orders for the car have increased 1700 in the past 10 days and that orders for more than 1100 cars were taken at the 11 big shows in the country where the car was exhibited.

Large demand for the car in the East was indicated, he said. The New York branch, outside of the metropolitan area, required 819 cars in February, the metropolitan area required 412, and the Philadelphia area, which includes western Pennsylvania, required 997.

Jordan Shipments Double

CLEVELAND, Feb. 20—Shipments by Jordan Motor Car Co. in February will be almost twice as large as in the average February, according to E. S. Jordan, president. Dealer stocks are lower than usual at this time of year and the used car situation has eased up materially, Mr. Jordan said.

Fordson Discontinued Says Ford Statement

DETROIT, Feb. 23—Ford Motor Co. has announced that it has discontinued the manufacture of Fordson tractors.

The company declares that while the Ford industries were curtailing operations pending introduction of the new car last summer, enough tractors were built to supply the trade for some time to come.

The company will continue to manufacture replacement parts for the upwards of 500,000 Fordson tractors now in the field.

Reo Lowers Truck Prices and Adds 4 New Models

LANSING, Feb. 23—Reo Motor Car Co. has reduced prices from $40 to $260 on a majority of its commercial vehicles and has introduced four new commercial chassis. The new models include a new one-ton type with 138 in. wheelbase at $1,075; a one and one-half ton with 148 in. wheelbase at $1,345; a two-ton master Speedwagon of 164-in. wheelbase at $1,645, and a heavy duty dump truck with capacity for two cubic yards on 130 in. wheelbase at $1,935.

The one-half ton Junior chassis on 115 in. wheelbase at $895, is unchanged, and the one-ton 123-in. wheelbase model is unchanged at $995.

Watson Orders Increase

PHILADELPHIA, Feb. 20—Unfilled orders of John Warren Watson Co. on Feb. 15 were 143 per cent ahead of the volume on Feb. 28, 1927, the company reports. January shipments in units were 64 per cent ahead of January last year.

Graham-Paige to Build 3700

DETROIT, Feb. 23—Graham-Paige Motors Corp., will build 3700 cars in February, a gain of 76 per cent over January and 146 per cent over February last year. The company reports sales exceeding last year.

January Production Under 1927 Output

	Cars	Trucks	Total
1928			
Jan. ..	205,737	27,765	233,502
1927			
Jan. ..	211,395	42,907	254,302
Feb. ..	278,997	44,411	323,408
Mar. ..	365,634	52,033	417,667
Apr. ..	377,899	51,449	429,348
May ..	379,139	50,666	429,805
June ..	295,198	45,956	341,154
July ..	245,585	33,871	279,456
Aug. ..	284,489	36,819	321,308
Sept. .	235,121	36,519	271,640
Oct. ..	189,177	38,224	227,401
Nov. ..	114,076	25,743	139,819
Dec. ..	108,356	28,626	136,982
Total..	3,085,066	487,224	3,572,290

U. S. Plants Build 225,039 Canadian Factories 8463

WASHINGTON, Feb. 23—January production of automobiles in the United States totaled 225,039, of which 199,032 were passenger cars and 26,007 were trucks. Production in Canada during January totaled 8463, of which 6705 were passenger cars and 1758 were trucks, according to figures of the U. S. Department of Commerce.

Revised figures of the department place the United States total production of automobiles and trucks during 1927, at 3,394,255, compared with 4,298,799 manufactured during 1926—a decrease for the year of 904,544 units. Canadian production for the year, according to the revised figures, totaled 179,426 compared with 205,092 manufactured during 1926.

Massey Harris Acquires J. I. Case Plow Works Co.

MILWAUKEE, Feb. 18—Formal announcement is made of the acquisition of all of the assets and good will of the J. I. Case Plow Works, Inc., Racine, by the Massey Harris Co., Ltd., Toronto, which exercised an option taken Feb. 14, 1927. The Case company, established in 1876, is an extensive manufacturer of plows and tractors, and its products have been distributed by the Massey Harris interests in Canada and the British Empire for some time past. The tractor is known as the Wallis. The company has no connection with the J. I. Case Threshing Machine Co.,

Builds Small Tractor

SAN FRANCISCO, Feb. 21—Caterpillar Tractor Co. announces approaching quantity manufacture of a baby tractor, to be known as "Caterpillar No. 10," to compete in the Fordson field.

Mack Truck Profit $5,844,307 in 1927

Year's Sales $55,270,295 Against $69,032,203 in 1926 —Surplus $51,101,649

NEW YORK, Feb. 21—Net profit of Mack Trucks, Inc., in 1927 was $5,844,307, equal to $6.59 a share after preferred dividends, this comparing with earnings of $8,852,453, or $10.81 a share, in 1926. Sales for the year totaled $55,270,295, against $69,032,203 in 1926. Surplus after dividends was $425,952 against $3,738,550.

Total assets at the close of 1927 were $69,305,387, against $83,021,639 the year previous. Surplus was $51,101,649 against $52,070,331, reserves were $1,832,850 against $2,905,649, and Series A secured notes were $2,600,000 against $2,800,000.

At the close of 1927 the company called for redemption the entire issues of first and second preferred stock, aggregating $16,253,591 in par value, leaving only common stock outstanding. The greater part of the funds needed were available but $7,000,000 bank loans were incurred.

Hupp Earnings $2,719,164

DETROIT, Feb. 20 — Hupp Motor Car Corp. reports net profit of $2,719,164 in 1927, equal to $2.70 a share, which compares with earnings of $3,507,628 or $3.48 a share in 1926. Net sales in 1927 were $44,734,430 as against $50,342,606 in 1926.

Timken Bearing Net $9,554,397

CANTON, OHIO, Feb. 21—Net profit of the Timken Roller Bearing Co. for 1927 was $9,554,397 which compares with $9,854,310 in 1926, according to the annual report. Coincident with the report, Mr. Timken predicted a banner year in 1928. Bearings made by the company are being used in virtually every make of automobile in the country and production will be greatly increased during the coming six months. Ford production alone is responsible for heavy increase.

Goodrich Profit $12,780,306

AKRON, Feb. 21—Net profit of B. F. Goodrich Co. for 1927 was $12,780,306, before transfer of $1,000,000 contingent reserve. This compares with $5,065,110 in 1926 after transferring $5,000,000 contingent reserve previously set aside. This is equal to $15.44 a share on the common, after preferred dividends, against $4.16 a share in 1926.

White Reduces Dividend

CLEVELAND, Feb. 20—White Motor Co. has declared a quarterly dividend of 25 cents, half the previous payment. Only one dividend was paid at the rate of 50 cents quarterly, the prevailing rate previous to that being $1 quarterly.

Court Rules Owners Have Recovery Right

WASHINGTON, Feb. 20—The Supreme Court has decided that owners of automobiles, whether individuals or financing companies, are to be given an opportunity to recover their cars when used without permission of the owners in the unlawful transportation of intoxicating liquor. The decision is regarded as a blow to the practice on the part of enforcement officers to confiscate such vehicles under a section of the Internal Revenue law.

Goodyear 1927 Net Rises to $13,135,666

AKRON, Feb. 20—Total net profits of Goodyear Tire & Rubber Co. in 1927 were $13,135,666, compared with $8,799,138 in the preceding year, according to the annual report issued today. Total unit sales showed an increase of 15 per cent over 1926 while consolidated net sales were $222,178,540, about 3½ per cent less than in the preceding year, reflecting lower prices.

Consolidated surplus at the close of the year was $25,589,105 after dividends of $5,645,378; deducting charges of $9,606,195 for refinancing and extraordinary legal and other expenses, and reserving $3,000,000 for loss on liquidation of subsidiary properties.

An additional 29,000 acres of rubber land in Sumatra was acquired during the year and new manufacturing plants were established in Sydney, Australia, and Wolverhampton, England. Combined capacity is now approximately 75,000 tires and tubes daily.

Bantam Ball Bearing Co. to Move to South Bend

WATERBURY, CONN., Feb. 20—Bantam Ball Bearing Co. will move to South Bend, Ind., to be closer to the large middle western automotive centers, the announcement being made by W. W. Gager, vice-president, who has returned from South Bend, where he authorized the construction of a new plant. While there Mr. Gager organized the Bantam Ball Bearing Co. of Indiana, which is capitalized at $150,000.

C. I. T. Diversifies Financing

NEW YORK, Feb. 20—Commercial Investment Trust Corp. reports net earnings of $3,003,393 in 1927 compared with $3,504,376 in 1926. The company acquired total obligations in 1927 of $188,271,263, compared with $206,113,930 in 1926. Greater diversification in its financing made it possible for the company to offset the reduction in the sale of cars, installment paper, other than automobile paper, increasing approximately 60 per cent.

M. & A.M.A. Indexes Show January Gains

Original Equipment Sales Follow Higher Output—Shows Boost Tool Buying

NEW YORK, Feb. 21 — January business in parts and accessories showed a marked increase, according to index figures just prepared by the Motor & Accessory Manufacturers Association.

The grand index for all groups is placed at 153, which compares with 109 in December, and shows a decided increase over January in 1927 and 1926. Index for original equipment is 163, which compares with 111 for December. Replacement parts is 137 compared with 126 for December. Accessories stand at 79, compared with 61 for December, and shop equipment is 142, compared with 104 in December.

The most marked increase, registered in original equipment, is due to the stepping up of production on new lines at the beginning of the year. The marked increase in shop equipment is attributed to the interest developed in the shop equipment sections of the national shows, which this year were regarded as the most successful exhibits of this type ever held.

The comparatively slight gain in accessories is laid to the fact that these figures are based on sales to the trade and the growing volume of accessory sales to car manufacturers, who themselves distribute through dealers, is not taken into account in computing this index.

Parts-Accessory Exports Increase 24.6% in 1927

WASHINGTON, Feb. 23—Automobile parts, accessories and service appliances exported during 1927 totaled $65,044,886, and represented an increase of 24.6 per cent over exports of similar automobile products in 1926, according to figures of the U. S. Department of Commerce.

Automobile parts made up a total of 16 per cent of the year's aggregate export valuation of automobile products, which amounted to $406,700,986. Automobile accessories exported in 1927 totaled $7,873,568, which was 15 per cent less than exports of accessories in 1926.

Houpert Machine Merged

DETROIT, Feb. 20—The Houpert Machine Co., Long Island City, N. Y., has been merged with the Cleveland Piston & Mfg. Co.

Russell Heads Republic

DETROIT, Feb. 20—A. G. Russell has been elected president of the Republic Gear Company, Detroit, succeeding H. N. Nigg, resigned.

G.M. January Sales Increase to 107,278

Gain from Previous Year Exceeds 25%—Shortage Limits Sales, Says Sloan

NEW YORK, Feb. 18—General Motors Corp. reports retail sales to consumers during January as 107,278 cars, comparing with 81,010 for January, 1927, recording a gain of 32.4 per cent. These gains were made in practically all car divisions. Sales to dealers during January totaled 125,181 cars, comparing with 99,367 a year ago, or a gain of 26 per cent. Alfred P. Sloan, Jr., president, said:

"Retail sales were somewhat limited during the month on account of the fact that stock in the hands of dealers was limited, due to the bringing out of certain new models at the beginning of the year."

Comparison of sales with the two preceding years follows:

	Dealers' Sales to Users		
	1928	1927	1926
Jan.	107,278	81,010	53,698
Feb.	.....	102,025	64,971
Mar.	.....	146,275	106,051
	Divisions Sales to Dealers		
	1928	1927	1926
Jan.	125,181	99,367	76,332
Feb.	.....	124,426	91,313
Mar.	.....	161,910	113,341

Europe Seeking Markets in U. S., Declares Mooney

NEW YORK, Feb. 22—J. D. Mooney, president of General Motors Export Co., arrived today on the S. S. Olympic after an extended trip reviewing the European operations of his company. He stated that Europe feels that the United States must purchase more of its products before our exports are increased much further. European exports have increased 29 per cent since 1914, while the United States has gained 95 per cent in export trade, Australia 106 per cent and Asia 155 per cent.

Mr. Mooney, however, looks for normal gains in export during 1928. He pointed out that 193,830 General Motors cars were sold in the export market at a value of $180,014,700 in 1927, as compared with 118,791 cars, valued $107,387,300 in 1926. Of this export, Europe absorbed 55,708 units, valued at $59,799,700 in 1927, as compared with 34,712 units, valued at $36,865,700 in 1926.

"The outlook for the automobile business in the overseas markets continues good because countries are comprehending that the United States has gained much by making it easy for people in all walks of life to own and operate automobiles and other countries are resolved to enjoy some of those same benefits," said Mr. Mooney. "Even in those countries in Europe which manufacture motor vehicles and which have imposed high protective tariffs for the sake of domestic concerns, there are questions being asked whether any system of taxation which makes it more difficult for the people to own cars is a sound one.

"The government of one European country is making an investigation of the causes to learn why that country is able to absorb so small a percentage of the automobiles manufactured in that country."

India Contracts for First Concrete Road

WASHINGTON, Feb. 18—A contract for the first concrete highway in India, totalling 14 miles, has been placed by the government, according to a report of Trade Commissioner Stofford to the Department of Commerce. The road will be built from Benares to Modhal Strai. The department is advised that the experiments are believed to be a manifestation of the government's good road movement, and will ultimately mean considerable to the automobile industry of the world.

General Motors Exports Rise to 193,830 in 1927

NEW YORK, Feb. 23—General Motors sold 193,830 cars abroad during 1927, according to an announcement just made by Alfred P. Sloan, Jr., president. This compares with 118,791 cars sold in 1926 and 100,894 in 1925.

Sales by quarters were as follows:

Period	1927	1926	1925
1st Quarter	39,443	31,936	15,577
2nd Quarter	53,009	31,861	26,277
3rd Quarter	48,885	22,799	25,906
4th Quarter	52,493	32,195	33,134
	193,830	118,791	100,894

These figures are the sales by General Motors export organizations, but do not include sales of Vauxhall Motors, Ltd., or overseas sales of the products of Yellow Truck & Coach Mfg. Co.

Franklin Sales Increase

NEW YORK, Feb. 18—Franklin Automobile Co. has added five new dealers and has opened new branches for two of the established dealers during the past few weeks. January sales show an increase of 2½ per cent over a year ago and exceed all previous Januaries excepting 1921, when a special campaign was staged.

Overland Sells 364 in N. Y.

NEW YORK, Feb. 20—The New York branch of Willys-Overland Co. reports retail car orders taken during the New York show period totaled 364 units. Prospects attending during the show period averaged around 400 a day, with about 300 requests for literature each day.

General Motors Net Equals Sales Growth

Statement Analysis Shows 20% Rise in Profits and Sales—Production Gain 27.9

PHILADELPHIA, Feb. 21—Although the profit record of $235,104,826 established by General Motors Corp. in 1927 is sufficiently striking, study of the preliminary report just issued reveals some figures that are hardly less significant.

Earnings on a directly comparable basis, for instance, advanced in almost exact correspondence with the gain in sales. Last year's sales of $1,269,519,673 were 20 per cent over the 1926 figure of $1,058,153,338; while earnings were 20.8 per cent better than the previous year's total of $194,645,462, the latter figure including the minority interest in Fisher Body Corp. earnings.

The gain in production was greater than the gain in dollar sales volume or net earnings, due no doubt to the fact that the production gain was largely in the lower-priced cars. The production gain was 27.9 per cent, and the indicated profit per unit of production was $150 in 1927 against $160 in 1926. Of course many items enter into profits beside car and truck sales.

Net profits on sales in 1927 were 18.5 per cent in 1927 against 18.4 per cent in 1926.

Cash in banks, United States Government securities and marketable securities at the close of the year amounted to $208,176,198. This compares with $135,398,386 at the close of the previous year. Sight drafts were $14,649,097; inventories, $172,647,716; total current assets $432,280,123 and current liabilities $159,356,147. This leaves an excess of current assets over current liabilities of $272,923,976. The total of capital stock and surplus increased $123,477,765, of which $94,373,598 is accounted for by earnings reinvested in the business, and the balance of $29,104,167 by the sale of $25,000,000 par value General Motors Corp. 7 per cent preferred in February, 1927.

Investment in real estate, plant and equipment at Dec. 31, 1927, was $480,473,508 compared with $434,373,903 at Dec. 31, 1926, an increase during the year of $46,099,605, representing an expansion in the corporation's facilities. Reserves for depreciation of real estate, plants and equipment show a net increase of $17,980,000.

Develops Dozen Devices

NEW YORK, Feb. 18—Celebrating its second year, the Automotive Royalties Corp. has moved its enlarged engineering staff into additional space in the French Building, 551 Fifth Ave. The enlargement was occasioned by the development of more than a dozen devices ranging from a new gasoline engine to a quick adjustable wrench and including a new lubricating system, shock absorber and brake.

Steel Price Course Waits Developments

Adjustments on Compromise Basis Seen Following Conditions in the Market

NEW YORK, Feb. 23—Aside from fairly heavy specifications against existing contracts at old prices, conditions in the steel market present a rather tame appearance. Automotive consumers appear to be so well covered over the remainder of this quarter that a good deal of old-price steel is expected to be carried over into second quarter. Far from assuming an arbitrary attitude with reference to second quarter prices, steel producers are proceeding very cautiously and tactfully.

While conditions in the automotive market are such as to simply compel holding down costs by might and main, motor car manufacturers and parts makers refrain from the usual tactics of the buyer when he means to resist price advances. Apparently they are satisfied to let developments shape the market. If between now and the time when they must come into the market for their major second-quarter requirements general conditions show improvement, prices will very likely adjust themselves on a compromise basis.

While there is talk of further advances in steel bar and strip prices, a much more sober view of conditions is making itself felt. The more conservative producers are wondering just how much of the volume of demand that set in during the latter part of January is for account of the current quarter's needs and how much of the steel was bought for second quarter requirements on the theory that, while prices might go higher, they will not come down.

Pig Iron—Moderate sized orders for second quarter delivery have been placed by automotive foundries. The market shows a slightly stronger tone.

Aluminum—While quite a little aluminum is being shipped to automotive consumers, fresh demand is rather backward. Prices for both vergin and remelted metal are unchanged.

Copper—Domestic demand for both copper and copper products, including automotive brasses, is rather hesitant. Producers continue to support the market which is just about holding its own.

Tin—The London market has shown signs of rallying, but, because of the highly speculative conditions that prevail there, consumers fear that the short interest may be simply taking a short nap. Straits shipments in 1928 are expected to exceed those of 1927 by 10 to 15 per cent, and the lower prices recently chalked up are interpreted as discounting this addition to the supply.

Lead—Lower prices induced some buying by storage battery consumers. Formation of a Lead Institute, organized along the lines of the Copper Institute, for the exchange of statistical information among producers, is talked of.

Zinc—Consuming demand is a shade better, but the market's tone continues easy.

Excise Tax Payments Decline in January

WASHINGTON, Feb. 22—Excise taxes based on 3 per cent tax on passenger cars, collected by the Federal government during January, totaled $1,901,436 compared with $2,661,866 collected in January, 1927, a reduction of $760,429, according to figures just announced by the U. S. Bureau of Internal Revenue. Collections for the seven-month period from July 1, 1927 to Jan. 31, 1928, totaled $33,143,526, compared with $39,686,129 collected from July 1, 1926 to Jan. 31, 1927, a reduction of $6,724,603.

Graham-Paige Subsidiary Buys Evansville Plant

EVANSVILLE, IND., Feb. 20—Motor Bodies, Inc., newly organized subsidiary of Graham-Paige Motors Corp., has taken over the plant of the former Johann Mfg. Co., for the manufacture of Graham-Paige bodies according to corroborative statement from W. R. Neely, Detroit, president. The officers of the new company are: W. R. Neely, president; William Allen, vice-president and general manager; R. C. Hicks, secretary-treasurer. The officers with Joseph B. and Robert C. Graham form the board of directors.

Work of remodeling the plant building will be started at once. About 150 skilled workmen will be employed at first on building of Graham-Paige roadster and touring car bodies.

Durant Elizabeth Plant Now Building 500 Daily

NEW YORK, Feb. 20—Durant Motors, Inc., placed a second assembly line in operation at its Elizabeth, N. J., plant today, bringing its production up to 500 cars a day. Production will be stepped up further as fast as material can be obtained, according to T. S. Johnston, assistant to W. C. Durant. It is expected that a third line will be in operation about the first of March and a fourth line will follow shortly thereafter, bringing total production up to 1000 cars a day.

Extend Coast Plant Territory

SAN FRANCISCO, Feb. 20—Utah and Idaho have been added to the territory to be supplied with Star and Durant cars from the plant in Oakland, Cal.

Dates Materials Handling Meeting

NEW YORK, Feb. 18—The materials handling division of the American Society of Mechanical Engineers will hold its first national meeting in Philadelphia, April 23 and 24.

Labor Survey Shows Employment Increase

Influx of Labor in Detroit and Other Centers Maintaining Surplus

WASHINGTON, Feb. 22—A noticeable improvement in employment conditions in the automobile industry is reported by the U. S. Department of Labor in its February survey of industrial employment throughout the United States. The department finds that although there was an encouraging increase in the volume of employment in the automobile industry, there are still many automobile factory workers unemployed.

The iron and steel mills increased their forces somewhat and a further improvement by March 1 in both automobile and iron and steel industries is expected. Many states report large building programs and a substantial increase is practically assured in the steel and allied industries due to the recent placement of large orders by automobile manufacturers and railroads.

Industry Employs 750,000 Displaced by Machinery

WASHINGTON, Feb. 22—The automobile was given credit as being the greatest factor in relieving unemployment in the United States today, according to an address this week of Dr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce, speaking before a conference of 400 executives of chemical and allied interests. The conference had under discussion the question of unemployment through modern machinery displacing large numbers of workers.

Doctor Klein stated that since 1919 there has been a reduction of 900,000 in the number of factory workers. This number, he pointed out, however, has been largely offset by the automobile and restaurant industries. In the former, he said, the selling of automobiles, operation of garages and service stations had taken care of 750,000 men who would have been thrown out of employment since 1919. In the restaurant business, he pointed out, a striking gain had been made, the figures showing an increase of nearly 1,000,000 employees since the war. He stressed the point that as modern machinery displaces man power that this same man power will be allocated to other industries.

National Gauge Sales Gain

NEW YORK, Feb. 20—January sales of National Gauge & Equipment Co., subsidiary of The Moto Meter Co., Inc., were $380,359, the highest in the history of the company. The Moto Meter Company is increasing production on dash type indicators 50 per cent, to 1000 instruments a day.

Men of the Industry and What They Are Doing

Brandt Joins Autocar as Production Executive

A. J. Brandt, formerly vice-president in charge of operations of Oakland Motor Car Co., has been retained by the Autocar Co. to take entire charge of all factory operations at its Ardmore, Pa., headquarters. He will be in charge of all manufacturing operations, including layout, processing and assembling methods, and the purchase of materials and equipment.

From 1916 to 1918 Mr. Brandt was identified with E. I. duPont de Nemours & Co., Inc., joining General Motors Corp. in 1919 to take charge of the building of several large plant additions. Later he was production manager of the former Samson tractor division and when that division was changed to other activities became identified with Fisher Body Corp. In May, 1924, he was transferred to erect a new malleable iron factory for the Pacific Malleable Casting Co. and a year later joined Oakland Motor Car Co. as vice-president in charge of operations.

Dodge Officials Promoted

William Hufstader has been named director of used cars sales of Dodge Brothers, Inc., succeeding J. W. Hutchins, who has been promoted to director of district supervisors. Mr. Hufstader returns to the factory after a year at St. Louis for Dodge Brothers. He was associated previously with Flint Motor Co.

Bly Joins Goodrich

Carl Bly, sales manager of Mason Tire & Rubber Co., has resigned to accept a position as truck tires sales analyst with B. F. Goodrich Co. Previous to joining Mason, Mr. Bly was with Goodyear, and was advertising manage of Republic Rubber of Youngstown.

Chalfant Voted Vacation

E. P. Chalfant, executive vice-president of the National Standard Parts Association, and Mrs. Chalfant, will sail from New York, Feb. 29, for a one-month cruise in the Caribbean Sea. The trip will be taken as a 30-day vacation which the board of directors voted some time ago.

Soper Heads Velie Sales

F. B. Soper, for 20 years with the Velie Motors Corp., and for the last year and a half assistant sales manager, has been advanced to sales manager. He succeeds L. F. Murphy, resigned.

Carlton Back from Europe

C. C. Carlton, secretary of the Motor Wheel Corp., has returned home following a month's business trip to England.

R. H. Collins Becomes Cadillac Distributor

Evidence aplenty of the stability of automobile selling as a profitable business is contained in the announcement that R. H. Collins has become Cadillac-La Salle distributor in Oregon, following the recent appointment of his three sons as Oakland-Pontiac dealers in Portland and Seattle.

R. H. was formerly vice-president of General Motors Corp., president and general manager of the Cadillac Motor Car Co., president and general manager of the Peerless Motor Car Corp. and general sales manager of Buick Motor Co.

Firestone Promotes Cope

R. J. Cope, formerly Firestone branch manager in Los Angeles, has been appointed general manager of the new Firestone Tire & Rubber Co., of California. Mr. Cope is succeeded at his old post by H. A. McKellar, who comes to Los Angeles from Detroit, where he was manager of the Firestone branch.

Bonbright Joins Graham

John M. Bonbright, formerly of the advertising department of the Paige-Detroit Motor Car Co., has joined the advertising staff of Graham-Paige Motors Corp. Mr. Bonbright went abroad last April, taking his own car with him and driving 16,600 miles through nine European countries.

Sweet Joins Fuller

Henry W. Sweet for 18 years chief engineer of the Brown-Lip-Chapin Co. has joined the engineering staff of Fuller & Sons Mfg. Co., Kalamazoo, Mich., manufacturer of transmissions.

Marmon Promotes Harding

Sam V. Harding, associated with the Marmon Motor Car Co. in a sales capacity for the last eight years, has been appointed regional manager for the Northwest and Central West.

Odell Heads Hutto District

O. G. Odell, of the sales staff of the Hutto Engineering Company, Inc., has been placed in charge of sales for the States of Ohio, Indiana and the lower peninsula of Michigan.

Thordarson Promotes Manly

H. P. Manly has been appointed sales manager for the Thordarson Electric Mfg. Co., Chicago.

Road Development in U. S. is Described by Erskine

Addressing the Second National Highway Congress in Havana, Feb. 22, A. R. Erskine, president of the Studebaker Corp. of America, representative of the National Automobile Chamber of Commerce, outlined the development of roads in the United States following the advent of the automobile. As vehicles grew in number, he said, owners asked for taxes on cars to build roads in order that they might have wider use of them.

"The problem in the United States has not been one of whether we could afford roads but rather one of how quickly we could afford them in order to stimulate prosperity," Mr. Erskine said. Through bond issues, he said, it is frequently possible to build as many miles of road in one year as could be built in 10 years if current taxes were used.

Strohm Rejoins Prest-O-Lite

Grover E. Strohm has been appointed special factory representative of the Prest-O-Lite Storage Battery Sales Corp. with headquarters in the General Motors Bldg., Detroit. Mr. Strohm is a member of the Society of Automotive Engineers and was formerly connected with the Prest-O-Lite in the Detroit territory.

Kistner Joins Demco

H. H. Kistner has resigned as vice-president and production manager of the Diamond Piston Ring Co., Baltimore, disposing of his interests to W. F. Peterson, president. Mr. Kistner is taking over the management of the Wardo Products manufactured by Demco., Inc., Baltimore, which has just begun manufacture of a line of shop equipment.

Forsyth Joins Diamond

Ben Forsyth has been named advertising and sales promotion manager of the Diamond Motor Parts Co. of St. Cloud, Minn., which was recently merged with the Gill Mfg. Co. of Chicago and the Schlieder Mfg. Co. of Milford, Mich.

Sonnenberg With S.K.F.

L. T. Sonnenberg has become associated with S.K.F. Industries, Inc., with headquarters in Cincinnati. He will cover automotive jobbers through the Southeast and a smaller portion of the Middle West.

Lawrence Visits Latin America

J. V. Lawrence of the foreign trade committee of the National Automobile Chamber of Commerce, sailed Feb. 18, on the S. S. Siboney for a tour of Latin American countries, where he will lecture on motor transportation.

King Quality Bought by McQuay-Norris

Company Will be Continued as Entity With Factory Moved to Indianapolis

ST. LOUIS, Feb. 20—McQuay-Norris Mfg. Co. has bought the entire automotive business of the King Quality Products Co., Buffalo. The company will be continued as an entity with no change in policy, prices, packages, catalogs and with no distribution change. The plant and offices, however, will be moved to Indianapolis, from which city all orders will be shipped after March 1.

In a statement to distributors, W. K. Norris, president of McQuay-Norris, said:

"We are proud of the fact that when the King Mfg. Co. found their other requirements necessitated a concentration of their entire plant facilities, they gave us the opportunity to acquire their automotive business. Knowing the obligation they felt to protect their customers' inventories and interests, we feel complimented that after surveying the field they offered us the opportunity to take over the business. We believe in the future of the replacement parts business. We believe it is a vital, permanent business and that the jobbers in it are performing a service that makes them permanent factors in the automotive business."

Ford and Cadillac Ads Among Harvard Winners

BOSTON, Feb. 18—Two automobile companies figured in the distribution of the Harvard advertising Awards for 1927, T. M. Cleland, New York, being awarded $1,000 for an advertisement of Cadillac Motor Car Co., titled Cadillac Creates a New Luxury in Motoring. This was held most effective in its use of pictorial illustration. Ford Motor Co. was awarded $1,000 for the advertisement held most effective in typography, this being titled Important Facts About the New Ford Car.

James H. McGraw, president of the McGraw-Hill Publishing Co., was awarded the [illegible] medal for Distinguished Contemporary Services to Advertising, because of his lifelong service in the upbuilding of higher standards in advertising in the business press of the country.

Timken Axle 1927 Profit Upheld by Burner Sales

DETROIT, Feb. 20—Timken-Detroit Axle Co. reports net profit of $1,540,530 in 1927 after depreciation and Federal taxes. After preferred dividends this is equal to $1.52 per share on the common stock. This compares with $1,772,460, or $1.80 per share on common stock in the previous year.

Balance sheet of Dec. 31, 1927, shows current assets of $8,804,517, which includes cash and certificates of deposit amounting to $3,624,106. Current liabilities total $917,433, leaving net working capital of $7,887,083.

President Fred Glover in his annual report to stockholders said: "While the earnings from the axle business reflect the falling off of earnings in the automotive industry generally, the oil burner business looks encouraging."

Davis Company Sold to Baltimore Group

BALTIMORE, Feb. 20—The George W. Davis Motor Car Co. of Richmond, Ind., has been purchased by the Automotive Corp. of America, with headquarters here. The new owners will continue the Davis line but will build also the "New York 8," an automobile designed to meet parking conditions in New York and other large cities. The new car will embody the parking wheel principle by which cars may be run sideways for parking. The invention is controlled by the Parkmobile Corp., a subsidiary of the Automotive Corp. of America.

BALTIMORE, Feb. 20—The Automotive Corp. of America was organized last year by Baltimoreans. The officers are W. E. Byrd, president; Villor P. Williams, first vice-president; John Werner, second vice-president; W. E. Tickner, treasurer, and Clarence A. Dankmeyer, secretary. It has two subsidiaries, the New York Motor Corp. of America and the Parkmobile Corp.

E. I. Musselman

PHILADELPHIA, Feb. 21—E. I. Musselman, father of C. A. Musselman, president of the Chilton Class Journal Co., died suddenly Feb. 18, in Philadelphia. He was in his eighty-fifth year. For many years, Mr. Musselman was a member of the firm of George DeB. Keim, a wholesale saddlery and hardware company. During the latter years of his life, he was connected with Chilton Class Journal Company.

Herbert F. Johnson

RACINE, Feb. 18—Herbert F. Johnson, head of S. C. Johnson & Sons Co., this city, internationally known manufacturer of automobile finishes, waxes, polishes, etc., died of heart disease this week. He was 60 years of age and a native of Racine, where his father established a factory that now has branches in Canada, England and Australia. Mr. Johnson was one of the most prominent men in the business and social life of Racine.

Harry S. Quine

AKRON, Feb. 20—Harry S. Quine, 51, General Tire & Rubber Co. publicity head, died Friday after an illness of three months. Mr. Quine had been with General seven years and was a widely known figure in the rubber industry and newspaper world.

Financial Notes

Republic Motor Truck Co. has passed its quarterly dividend on preferred stock due January 1, 1928.

Curtiss Aeroplane & Motor Co., Inc., has notified the New York Stock Exchange of proposed increase of common stock from 218,000 to 300,000 shares.

Gardner Motor Co. has notified the New York Stock Exchange of a plan to substitute for its 300,000 shares no par common stock 300,000 shares at $5 par.

Commercial Investment Trust Corp. is offering $15,000,000 20-year 6 per cent convertible debentures for the purpose of reducing bank loans to subsidiary companies. These bonds, which are priced at $100, are convertible into cumulative 6½ per cent first preferred stock at the rate of 10 shares for each $1,000 bond.

U. S. L. Battery Corp. has declared a quarterly dividend of $1 on common stock, 25 cents on preferred Class A stock, and 17½ cents on preferred Class B stock, all payable April 2 to stockholders of record Feb. 27. This represents an increase on the common stock dividend, which previously had been paying 50 cents a quarter.

Western Auto Supply Co. has declared a quarterly dividend of 75 cents, payable March 1 to stockholders of record Feb. 23. This places their stock, which previously had been on a $2 annual basis, now on a $3 basis.

Marvel Carbureter Co. has declared a quarterly dividend of 80 cents and an extra dividend of 20 cents, both payable April 2 to stockholders of record March 15 and 18, respectively.

Pierce-Arrow Motor Car Co. reports net loss for year ended 1927 of $783,200 after interest, depreciation and other charges. This compares with net income of $1,267,694, or $12.67 a share, in 1926. Unpaid dividends on preferred stock at the close of 1927 amounted to $44 a share.

Motor Products Corp. reports earnings for 1927 as $575,879 against $482,290 in 1926. Balance sheet as of Dec. 31, 1927, showed total assets of $7,215,057 against $7,929,714 the year previous. Cash totaled $317,728 against $509,581, and government securities $1,644,619 against $1,989,338.

Bohn Profit $1,181,606, Adds Two New Accounts

DETROIT, Feb. 20—Bohn Aluminum & Brass Corp. reports net profit of $1,181,606 in 1927 as against $873,744 in 1926. Sales in 1928 to date are 30 per cent ahead of the 1927 period. The company produced 10,000,000 aluminum pistons in 1927 and output this year is expected to reach 15,000,000. The company reports the signing of contracts for aluminum pistons with two major car producers since the New York show. Bohn has the entire Chevrolet contract and supplies 50 per cent of the Ford requirements.

Sales Tax on Cars Reduced in Canada

Rate is Cut to 4 Per Cent But Tariff Arrangements Are Undisturbed

OTTAWA, Feb. 21 — The Federal budget of Canada, brought down in the Canadian House of Commons, Feb. 16, by Hon. J. A. Robb, minister of finance, does not specifically mention automobiles in any detail, yet the price of automobiles in the Dominion is being reduced as a result of the tax and tariff changes which were instituted through the budget.

The sales tax of 4 per cent was reduced by Mr. Robb to 3 per cent and the result is a reduction in many commodities, including motor cars. The reduction ranges from $5 in the case of low-priced automobiles to as high as $60 in the most expensive models.

The reduction is slightly less than 1 per cent of the dealer's retail price as the sales tax is applied to the price quoted at factory without shipping charges added. It is pointed out that the tax reduction is sufficient to pay for the year's license in Ontario for an automobile in the $1,000 class. The saving on higher-priced models will be considerably greater, of course.

Tariff arrangements were left undisturbed for the year so that the industry in Canada has no worries on its hands in this respect. The income tax rate for corporations was cut from 10 to 8 per cent, thus giving further relief to manufacturers and dealers. Personal income tax has been given a general 10 per cent reduction, which fact would tend to improve business conditions generally in Canada because there will probably be a general increase in buying.

Kent-Moore Expands Line

DETROIT, Feb. 21—The Kent-Moore organization, which in the past has specialized on small flat rate tools and shop equipment for the dealer organizations of certain car and truck manufacturers, announces an expansion of its products to make them available for every make of passenger car and commercial vehicle. In addition to its original line which has been extensively adopted by dealers for certain makes of vehicles, it is introducing a new line which makes its devices adaptable to all makes of motor vehicles.

Splitdorf Buys Company

NEWARK, N. J., Feb. 20—Splitdorf-Bethlehem Electrical Co. has acquired control of the American Electric Motor Co., Cedarburg, Wis., which will continue to manufacture a self-ventilated polyphase induction motor from one-half to 125 hp. W. R. Davis is general manager of the company, and W. M. Sprinkman is in charge of industrial sales.

Several Years' Test Urged for Insurance

PORTLAND, ME., Feb. 18—"Compulsory insurance for automobile owners makes them more careless," said President Russell A. Harmon, of the New England American Automobile Association conference at its first meeting in Maine held here last night. "There is no relation between public safety and compulsory insurance," he continued, "and under such insurance in Massachusetts there were nearly 8000 more non-fatal accidents in the first year of such insurance than ever before. All other states should await the result of such legislation in Massachusetts for some years before they adopt similar laws."

Chilton Papers Win Editorial Awards

PHILADELPHIA, Feb. 21—*Automotive Industries* and *Motor World Wholesale* were awarded honorable mention in the Associated Business Papers 1927 contest for excellence in editorial work, it was announced at a recent meeting of the National Conference of Business Paper Editors in Boston. These two Chilton Class Journal publications were the only automotive business papers mentioned in the awards.

The award to *Automotive Industries* was earned by an article, "Potential Market Seen for 2,000,000 Trucks on U. S. Farms," by K. W. Stillman, assistant editor. This division of the contest called for "the best article, judged broadly on the basis of timeliness, accuracy, thoroughness, originality clearness of expression and usefulness." The winner was *Hardware & Metal.*

The award to *Motor World Wholesale* was in recognition of a series of articles on "Wholesale Automotive Distribution," by Leon F. Banigan, editor. This class of the contest sought to identify "the most definite and outstanding service to the field with which the publication is connected." The trophy was won by *Electric Railway Journal.*

Fageol Plans 40% Gain

SAN FRANCISCO, Feb. 20—Fageol Motors Co. of California produced almost twice as many trucks in 1927 as in 1926, and plans a 40 per cent increase in production for 1928, according to L. H. Bill, president. Production for 1920 was 320 trucks, and for 1927 was 639, while at present the company is working extra shifts to keep up with orders. Expansion and improvement of the plant to cost about $250,000 are to be made this year.

Tire Makers Deny Mileage Reduced

Declare Greater Wear Due to Traffic Compensated for by Improvements

AKRON, Feb. 20—Leading tire manufacturers flatly deny the American Automobile Association statement that modern traffic has reduced mileage and offer figures to prove that tire life has increased regularly during recent years. Constant improvement in quality of tires has more than offset harmful effects of modern traffic, such as red lights, stop-streets, speed, and the tendency to inflate tires improperly. Figures show that approximately 3.25 tires were used per car in the last 12 months against five tires 10 years ago. Figures have steadily declined to the three mark. Traffic figures cite six pounds underinflation per tire makes 25 per cent less mileage, and added speed from 30 to 45 miles an hour cuts down mileage 50 per cent. Traffic conditions are said by some tire experts to cut down tire life 50 per cent, but these are balanced by the pronounced quality increase in the last 10 years.

PHILADELPHIA, Feb. 21—The reply of the rubber manufacturers was directed to a statement issued by the American Automobile Association in Washington in which it was declared driving conditions had greatly decreased the average tire mileage. Among the conditions outlined were more frequent stops in traffic; improved acceleration tending toward tire abuse; more powerful brakes that grind off treads; smaller diameter wheels, and higher average speeds made possible by better roads and high powered engines.

The statement was issued as an additional reason for steps by the Federal government to guard against a foreign rubber monopoly.

Eaton Axle Purchases Perfection Heater Line

CLEVELAND, Feb. 20—Eaton Axle & Spring Co. has purchased the heater business of the Perfection Heater & Mfg. Co. This does not include the Swan carburetor business. Administrative offices and the manufacturing unit is being transferred to the Eaton plant where modern equipment is being installed. Several members of the Perfection personnel are joining the Eaton organization. The trade name Perfection will be continued.

Distribution to the jobbing trade will be through the Eaton Bumper & Spring Service Co., which maintains branches and warehouses in all leading cities.

Walter Bauer

NEWARK, N. J., Feb. 18—Funeral services were held this week for Walter Bauer, president of the Pyrene Mfg. Co., who died Feb. 12.

New York Societies Discuss Maintenance

Development of Specialization is Traced at Joint Service Meeting

NEW YORK, Feb. 20—Specialization in maintenance was discussed by four speakers at the February meeting of the Metropolitan Section of the Society of Automotive Engineers. The topics and speakers follow: "Engine Reconditioning"—Dwight W. Grover, Motor Craft Corp., Newark, N. J.; "Welding"—Charles Michaels, Michaels & Mourre, Inc., New York City; "Electrical Service"—F. L. Oberheu, United Motor Service, Inc., Detroit; "Brake Testing and Adjustment"—F. W. Parks, Cowdrey Brake Tester Organization, Inc.

Speaking on Specialized Service Down the Street, Mr. Oberheu said if history is at all apt to repeat itself, then I predict that the manufacturer of motor cars and the car dealer will play only a minor part in the actual service repair work of the future. In the final analysis, the leveling-out process in any industry depends upon how lazy or indifferent one side is and how alive and aggressive the other side may be.

He said the development of much of the specialized service was due to neglect and indifference on the part of the manufacturer and car dealer. There will be an ever increasing need for specialized service as people become more critical of their requirements. As competition in the motor car field becomes keener and dealers need to watch every corner closer, dealers will do well to work with the specialized station, he said.

The meeting was held jointly with the Automotive Service Association of New York and representatives of the Motor Truck Association of America, Motor Truck Maintenance Club, Motor Transport Division of the American Railway Association, and the New York Railroad Club were present.

Chile Waits Tariff Cut

WASHINGTON, Feb. 18—Passenger car sales in Chile are reported by cable to the Department of Commerce as to be much below normal for this season, due to pending reductions of duty. Truck sales are virtually at a standstill, excepting one brief transaction of 50 American trucks sold to the government.

Form French Marmon Company

PARIS, Feb. 7 *(by mail)*—With the object of effecting sales on the French market a French Marmon company has just been formed under the title Automobile Marmon (France). Present capital is 1,000,000 francs in 100 franc shares, fully paid, with the possibility of carrying the amount to 5,000,000 francs.

Metropolitan S.A.E. Dates Ship Meeting

NEW YORK, Feb. 20—The Saturnia, largest Diesel engine ship in the world, will be the scene of the March 28 meeting of the Metropolitan Section of the Society of Automotive Engineers. The meeting will include dinner on board and an inspection of the boat.

Los Angeles S.A.E. Holds Brake Session

LOS ANGELES, Feb. 18—Causes of various brake troubles were analyzed at the regular monthly meeting of the Society of Automotive Engineers. Dr. F. C. Stanley, chief engineer of the Raybestos Co., was the principal program speaker. He told of the progress made in the past few years in scientific research and development to bring brakes to greater efficiency. The great need of the day, he declared, is to educate all drivers of motor vehicles to keep their brakes in proper adjustment.

Other speakers were John H. Watrous, of Ferodo & Asbestos, Inc., who handled the subject, "Brake Linings—Cause of Wear"; E. M. Rondot, Southern California Edison Company, on "Brakes and Brake Development"; J. G. Hulme, of Pickwick Stages, on "Brake Adjustment"; J. E. Van Sant, of the Paul G. Hoffman Co., on "Brake Testing"; and M. E. Foster, of the Electric Equipment Co., on "Brakes with BK Vacuum Attachment."

Coast S.A.E. Sees Ford Film

SAN FRANCISCO, Feb. 20—The Northern California Section of the Society of Automotive Engineers saw motion pictures of the manufacture of the new Ford, and heard two interesting technical addresses at the February meeting and dinner at the Engineers' Club in this city. William Bendal, chief mechanic of the San Francisco Municipal Railroads, presented an interesting paper on "Shop Practice," and A. V. La Due, technical editor of "Pacific Radiator," discussed "Developments in Flat Rate." The next meeting will be devoted to "brakes," and will be held March 8, in San Francisco.

Republic Offers New Line

DETROIT, Feb. 18—A complete new line of road-building and road-maintenance trucks has been introduced by Republic Motor Truck Co. There are three models, model 88, of 1 1/3 yd. capacity; model 58, of 2-yd. capacity, and S-25WB of 3½-ton capacity. Each model is designed to fit a distinct and separate need in this particular field of truck transportation, and includes a number of advanced and exclusive features.

Model Traffic Code Reaches Final Stage

Provides for Passing on Right, Conforms Traffic Lights and Clarifies Parking

NEW YORK, Feb. 18—A tentative uniform traffic ordinance was adopted this week at a meeting of the drafting committee of the National Conference on Street and Highway Safety at the Chamber of Commerce of the United States in New York. The model ordinance will now be printed and sent to police departments, traffic engineers and all interested organizations.

The model ordinance takes up the detailed driving rules for congested intersections, arterial or boulevard stop streets, one-way streets, alleys and other points peculiar to cities. Recognizing the difficulty of keeping slow moving traffic close to the curb, a provision is included permitting passing on the right on wide thoroughfares under proper conditions.

The model ordinance will recognize both the two color (red-green) and the three color (red-green-yellow) system of traffic lights and will contain alternative provisions applicable to these systems but designed to give automobile drivers a definite understanding as to what the different signals mean. The ordinance is designed particularly to cope with the problem of drivers who have a tendency to beat the light.

The ordinance will provide for greater protection of pedestrians both at controlled and uncontrolled intersections. It will offer for the first time standard rules regarding the respective responsibilities of motorists and pedestrians on city streets.

The proposed ordinance will clarify the question of where a vehicle may stop momentarily to drop or take on a passenger, where it may stop only for loading or unloading, where it may stop and remain parked. Other important provisions have to do with safety zones, overtaking street cars, clearing the way for fire and other emergency vehicles, railroad grade crossings, clinging to moving vehicles and other matters relating to children playing in the streets.

Form Airports Corporation

NEW YORK, Feb. 18—American Airports Corp. has been organized for the establishment and operation of airports in conjunction with local interests throughout the country. Colonel Stedman S. Hanks of Stedman Hanks & Co., Inc., New York, is president, and the directors include Major General John F. O'Ryan, president of the Colonial Air Transport, Inc.; William B. Mayo, chief engineer, Ford Motor Co.; George Mixter, vice-president, division of aeronautics, Stone & Webster, Inc., and ex-Senator James W. Wadsworth.

High Pressure Tires Show Stock Decline

NEW YORK, Feb. 20—Inventories of tire casings and tubes, all types, have shown a continuous increase, according to figures just issued by the Rubber Association of America, Inc., as of Jan. 1. Shipments of tires as a group has shown a decrease, although there has been an increase in the case of balloon casings and tubes. Production, as a whole, has decreased but again balloon casing and tube production has increased. High pressure casings and tubes have shown the most marked increase in inventories, with decided decrease in both production and shipment. The balloon casing and tube inventories have both decreased.

Comparisons follow:

	Inventory	Production	Shipments
Balloon Casings			
Dec. 1927....	3,844,039	1,824,668	1,710,893
Nov. 1927...	3,897,982	1,601,372	1,612,347
Dec. 1926 ..	3,141,505	1,502,724	1,537,085
Balloon Inner Tubes			
Dec. 1927....	4,523,047	1,617,875	1,734,026
Nov. 1927....	4,630,880	1,263,065	1,460,933
Dec. 1926....	4,133,865	1,440,646	1,628,872
High Pressure Cord Casings			
Dec., 1927	3,649,536	1,487,624	1,368,158
Nov., 1927	3,509,342	1,713,842	1,556,780
Dec., 1926	4,047,557	1,857,821	1,861,272
High Pressure Inner Tubes			
Dec., 1927	5,745,949	2,108,924	1,800,026
Nov., 1927	5,557,954	2,318,229	2,080,995
Dec., 1926	8,016,198	2,517,035	2,468,262

Mullins Gets Big Order

SALEM, OHIO, Feb. 21—A million-dollar order has been closed with Mullins Mfg. Co. by a leading automobile manufacturer, company officials announced Tuesday. The order is for fenders, splashers hoods and hood sills. Work will not start until about May, due to necessity of having tools made.

Coming Feature Issue of Chilton Class Journal Publications

June 23—Engineering Issue—Automotive Industries

De Lavaud Holdings Corp. to Promote World Patents

PARIS, Feb. 7 *(by mail)*—The De Lavaud Holdings Corp., Ltd., with a capital of £220,000 sterling has just been incorporated in London with the object of exploiting the world patents covering the Sensaud de Lavaud automatic transmission, independent wheel suspension, differential free wheel, and other devices applicable to automobiles.

Sensaud de Lavaud is now producing automobiles embodying his various patents, but the main business of the holdings corporation will be the licensing of manufacturers to use his patented features.

Electric Truck Show in March

NEW YORK, Feb. 18—New York Edison Co. will hold its eighth annual electric truck show in the showrooms at 130 East Fifteenth St., March 5 to 10, inclusive. A new feature of the show will be a three-day electric truck conference, held March 6, 7 and 8, open to all truck operators and representatives of firms having transportation and delivery problems.

Birmingham Sales Increase

BIRMINGHAM, Feb. 20—The Birmingham show witnessed a marked increase in "spot sales" most of which were made to buyers who had never owned cars, according to dealer reports. Attendance was close to 100,000.

Spokane Dealers Net 2½ Per Cent on Sales

SPOKANE, Feb. 18 — Automobile dealers in Spokane sold $24,484,750 worth of automobiles during 1927, according to a survey just completed by Harry Heylman, secretary of the Spokane Dealers Association. The yearly net profits on the sales were $657,936 or about 2½ per cent. The survey was made by sending a questionnaire to each dealer, who filled it out and returned it unsigned.

The figures show that automobile selling ranks well toward the top as the biggest business in the county and employs about 2 per cent of the total population.

The capital invested is $3,590,000, while the average capital used is $6,608,000. The yearly rents or equivalent cost the dealers $294,154.

Yearly taxes of all kinds in 1927, amounted to $180,477. The yearly payroll amounted to $2,769,617. These figures go far to show the enormous strides taken by the industry in this county which has a population estimated at 141,289, in the census taken in 1920.

Gives Car Lighting Data

NEW YORK, Feb. 18—The Motor Vehicle Conference Committee has printed and distributed statistical data on state regulations for motor vehicle electric lighting, as compiled by the National Lamps Works of the General Electric Co. This shows, in tabular form, the various regulations of the individual states on such factors as intensity, range, color, height from ground and mounting for head lamps, rear lamps, spot lamps, auxiliary driving lamps, stop signals, parking and marker lamps.

Calendar of Coming Events

SHOWS

All Western Road Show, Los Angeles, March 7-11
American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-28
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-13
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
Berlin .....Nov. 8-18
*Boston, Mechanics Bldg. ....March 10-17
Brussels .....Dec. 8-19
Copenhagen .....Feb. 23-March 4
Geneva .....March 16-25
International Aircraft Show, Berlin, March 23-April 11
Layback, Jugoslavia .....June 2-11
Leipzig, trucks only .....March 4-14
Lille, France .....April 6-22
London, passenger cars .....Oct. 11-20
Nice .....March 19-31
Oran, Algeria .....April 1-May 31
Paris .....Oct. 4-14
Paris, motorcycles .....Oct. 25-Nov. 4
Paris, trucks .....Nov. 15-25
Prague .....Sept. 1-9
Rio de Janeiro .....May 3-13
Salon, Automobile Salon, Inc., Palace Hotel, San Francisco..Feb. 25-March 3
Tunis, Tunisia .....April 27-May 6
United States Good Roads Show, Des Moines .....May 28-June 1
Vienna, Sample Fair .....March 11-17
Zagreb, Jugoslavia .....April 29-May 6

*Will have special shop equipment exhibit.

CONVENTIONS

American Electric Railway Ass'n., Public Auditorium, Cleveland...Sept. 22-28
American Gear Manufacturers Association, Hotel Seneca, Rochester, N. Y. .....April 19-21
American Society of Mechanical Engineers, Joint Meeting of Aeronautic and Wood Industries Divisions, Detroit .....June 27-28
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-13
American Society for Testing Materials, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J. .....June 25-29
American Welding Society, Engineers Society Bldg., New York...April 25-27
Automotive Equipment Association, Grand Hotel, Mackinac Island, June 10-16
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
Chamber of Commerce of the United States of America, Washington May 8-11
National Association of Credit Men, Hotel Olympia, Seattle, Washington .....June 11-16
National Foreign Trade Council, Houston, Texas .....April 25-27
National Hardware Association of the United States, Metal Branch, Copely-Plaza, Boston .....May 3-4
National Safety Council, Mid-West Safety Congress, Stevens Hotel, Chicago .....March 19
National Safety Council, Central States Safety Congress, Kansas City April 23-25
National Safety Council, National Congress, New York .....Oct. 1-5
Society of Automotive Engineers, Summer Meeting, Chateau Frontenac, Quebec .....June 26-29
United States Good Roads Association and Bankhead National Highway Association, Des Moines. May 28-June 1

RACES

Atlantic City .....May 5
Belgium .....Aug. 12
Detroit .....June 3
France .....July 1
Germany .....July 15
Great Britain .....Sept. 22
Indianapolis .....May 30
Italy .....Sept. 2
Spain .....July 29